

Disclaimer: Information contained in the report addresses environmental conditions only and is not the official South Florida Water Management District operations recommendation or decision.

M E M O R A N D U M

TO: John Mitnik, Chief, Engineering and Construction Bureau
Paul Linton, Administrator, Water Control Operations Section

FROM: SFWMD Staff Environmental Advisory Team

DATE: December 22, 2015

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Kissimmee

On Sunday, stages in East Lake Toho were ~0.4 feet below schedule and in Toho ~0.5 feet below schedule; Kissimmee-Cypress-Hatchineha (KCH) was 2.1 feet below schedule. With stage in KCH below 50.5 feet, S65 has been reduced to minimum discharge to the Kissimmee River (~300 cfs +/- 50 cfs). If KCH stage rises above 51 feet, discharge will be managed according the dry season standing recommendation subject to adaptive modifications (see recommendations). Over the past week, discharge at S65 averaged 358 cfs and at S65A 310 cfs; discharge at S65E averaged 650 cfs over the past week. Monday afternoon discharges: S65 ~405 cfs; S65A ~285 cfs; S65C ~530 cfs; S65E ~505cfs. Dissolved oxygen in the Kissimmee River averaged 6.31 mg/L over the past week and 6.94 mg/L on Sunday. Kissimmee River mean floodplain depth is currently 0.45 feet.

Lake Okeechobee

The winter/spring recession has recommenced this past week with the Lake receding by 0.04 feet. Lake stage is at 14.74 feet NGVD, and is in the Low Flow Sub-band. Ecological conditions continue to be good. MODIS satellite imagery indicated a small area in the west nearshore zone with potential elevated chlorophyll values.

Estuaries

Over the past week, total freshwater inflow averaged 760 cfs to the St. Lucie with no releases from Lake Okeechobee and 2454 cfs to the Caloosahatchee with 835 cfs Lake releases. In the St. Lucie Estuary, salinity rose but remained in the fair range for adult oysters in the mid-estuary. In the Caloosahatchee Estuary, salinities remained in the good range for adult oysters at Cape Coral, Shell Point, and Sanibel. Salinities were also in the good range for tape grass in the upper Caloosahatchee Estuary. Releases under LORS guidance will help reduce the risk of detrimental high inflows under the current strong El Niño.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs received approximately 2,500 acre-feet of Lake regulatory releases. The total amount of Lake Releases sent to the STAs/FEBs in WY2016 (since May 1) is approximately 172,000 acre-feet. Over the past week, as conditions allowed, the District released water from the A-1 FEB to STA-2 and STA-3/4. Many STA cells are above target depths and restrictions remain in place for structure repairs in STA-1E and vegetation rehabilitation in STA-1W. This week, no Lake releases are recommended to be sent to the STAs/FEBs. As conditions allow, releases will be made from the A-1 FEB to STA-2 and STA-3/4 to create storage in the FEB for future rainfall/runoff events.

Everglades

Rainfall was light this week, producing stage decreases. Water levels remain higher than a month ago, two months ago, and a year ago. The 30-day salinity at the Florida Bay Minimum Flows and Levels (MFL) site has decreased to 1.9 psu and the cumulative inflow from the five creeks into Florida Bay has increased to 173,900 acre-feet (68 percent of the average annual inflow of 257,800 acre-feet). Salinity in Florida Bay has decreased because of the recent heavy rainfall, but much more rainfall and inflow are required to approach seasonally normal conditions in Florida Bay and Everglades National Park (ENP). Southern WCA-3A stages have exceeded 2.5 feet for five weeks, the stage monitored for tree island inundation and duration.

Weather Conditions and Forecast

Some scattered shower activity mainly over the interior this afternoon. Enough moisture and instability exists across the area to allow daytime heating to generate some scattered showers and a couple of thunderstorms this afternoon. Steering winds should focus activity over the interior and then activity should taper off around sunset. High pressure is expected to build over the area Wednesday and Thursday and limit most shower activity each day. Shower activity should then increase a bit southeast on Friday and Saturday as some moisture moves across the District from the east but rainfall amounts should remain light.

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.25 inches of rainfall in the past week and the Lower Basin received 0.31 inches (SFWMD Daily Rainfall Report 12/22/2015).

Upper Kissimmee Basin

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in Table1.

Table 1. Departures from KCOL flood regulation (F) or temporary schedules (T, A, or S) (feet NGVD). Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: 12/22/2015							Sunday Departure (feet)						
Water Body	Structure/Site	Discharge (cfs), week's average**	Stage Monitoring Site***	Lake Stage (feet)	Schedule*	Regulation (R) or Target (S or T) Stage (feet)	12/20/15	12/13/15	12/6/15	11/29/15	11/22/15	11/15/15	11/8/15
Lakes Hart and Mary Jane	S62	6	LKMJ	60.6	R	61.0	-0.4	-0.5	-0.5	-0.4	-0.4	-0.6	-0.5
Lakes Myrtle, Preston, and Joel	S57	11	S57	61.4	R	61.8	-0.4	-0.4	-0.4	-0.5	-0.5	-0.5	-0.4
Alligator Chain	S60	0	ALLI	63.2	R	64.0	-0.8	-0.8	-0.8	-0.8	-0.8	-0.9	-0.8
Lake Gentry	S63	51	LKGT	61.1	R	61.5	-0.4	-0.2	-0.2	-0.2	-0.2	-0.3	-0.2
East Lake Toho	S59	16	TOHOE	57.6	R	58.0	-0.4	-0.6	-0.5	-0.6	-0.7	-0.9	-0.9
Lake Toho	S61	38	TOHOW	54.5	R	55.0	-0.5	-0.5	-0.6	-0.6	-0.4	-0.6	-0.6
Lakes Kissimmee, Cypress, and Hatchineha	S65	358	LKISSP, KUB011, LKIS5B	50.4	R	52.5	-2.1	-2.1	-2.1	-2.3	-2.4	-2.5	-2.4

* T = temporary schedule, R = USACE flood control schedule, S = temporary snail kite schedule, A = projected ascension line, N/A= not applicable or data not available.

** Seven-day average of weighted daily means through Sunday midnight.

*** Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.

DATA ARE PROVISIONAL

Lower Kissimmee Basin

Discharges and stages at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 11. Kissimmee River floodplain stages at selected stations are shown in Figure 12.

Table 2. Mean weekly discharge at S-65x structures, and mean weekly Phase I area river channel dissolved oxygen and floodplain mean water depth. Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: 12/22/2015

Metric	Location	Sunday's 1-day average	Weekly Average**									
			12/20/15	12/13/15	12/6/15	11/29/15	11/22/15	11/15/15	11/8/15	11/1/15	10/25/15	#####
Discharge (cfs)	S-65	356	358	247	272	267	402	443	828	1317	1593	1540
Discharge (cfs)	S-65A	313	310	293	296	272	290	325	656	1133	1419	1457
Discharge (cfs)	S-65C	550	584	693	674	749	687	840	1211	1713	1758	2151
Headwater stage (feet NGVD)		33.2	33.5	33.6	33.5	33.9	34.3	34.9	35.4	35.4	35.5	35.4
Discharge (cfs)	S-65D****	654	718	965	834	1016	860	957	1316	1978	1790	2291
Discharge (cfs)	S-65E	594	650	964	917	1026	806	769	1170	1771	1677	2203
DO concentration (mg/L)***	Phase I river channel	6.94	6.31	6.98	6.56	6.51	5.22	3.99	4.32	4.25	4.18	2.50
Mean depth (feet)*	Phase I floodplain	0.45	N/A	0.50	0.61	0.52	0.69	0.59	0.90	1.05	1.17	1.25

* 1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

** Seven-day average of weighted daily means through Sunday midnight.

*** DO is the average for PC62 and PC33 starting June 2. PC33 omitted for week of Aug16. DO for week of Sept 15-22 is for PC33 only.

**** S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2

***** 1-day spatial average from field measurements in Pools A and BC

N/A Not applicable or data not available.

DATA ARE PROVISIONAL

Water Management Recommendations

Kissimmee Basin Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
12/10/2015	Temporarily raise from 50.5 ft to 51 ft the threshold stage for increasing discharge at S65/S65A to 1400 cfs. This is a temporary modification of the current draft 2015-16 dry season Standing Recommendation (SR). Discontinue last week's temporary change in the rate of discharge increase and return to the original per-day rates shown in Table 1 of the draft SR - i.e., increase discharge to 1400 cfs at a rate of 150 cfs/day rather than 150 cfs/2 days. If KCH stage should start to decline while ramping up but before reaching 1400 cfs, begin to ramp back down using the rates in Table 1.	Slow the effect of discharge on KCH stage, balance KCH stage and KRRP discharge objectives.		KB Tech Team
12/9/2015	Maintain ~300 cfs at S65/S65A until average stage in KCH rises to 51 ft. This is a temporary modification of the current draft dry season SR raising the stage threshold for discharge rampup from 50.5 ft to 51 ft. Once stage reaches 51 ft, begin increasing discharge at a rate of 150 cfs/day per Table 1 in the draft 2015-16 Dry Season SR. Discontinue the temporary guidance provided below (12/2/2015) and return to the original guidelines for rate of discharge rampup per Table 1 (150 cfs/day rather than 150 cfs/2 days).	Slow the effect of discharge on KCH stage, balance KCH stage and KRRP discharge objectives.		KB Tech Team
12/2/2015	Temporary modification of draft Dry Season SR for rainfall forecast the week of Nov. 30. If stage in KCH increases to 50.5 ft, begin increasing S65 discharge to 1400 cfs at a rate of up to 150 cfs per 2 days rather than every day – this is half the discharge increase rate in Table 1 of the draft 2015-2016 Dry Season SR.	The slower discharge increase rate is a temporary change that is intended to allow time to assess whether or not we have entered a wetter period that would allow 1400 cfs to be sustained.	TBD	KB Ops
12/1/2015	No new recommendations.			
11/24/2015	No new recommendations.			
11/17/2015	No new recommendations.			
11/10/2015	No new recommendations.			
11/3/2015	No new recommendations.			
10/27/2015	No new recommendations.			
10/20/2015	No new recommendations.			
10/13/2015	No new recommendations.			
10/6/2015	No new recommendations.			
9/28/2015	No new recommendations.			
9/22/2015	No new recommendations.			
9/15/2015	No new recommendations.			
9/8/2015	No new recommendations.			
9/1/2015	No new recommendations.			
8/25/2015	No new recommendations.			
8/18/2015	No new recommendations.			
8/11/2015	No new recommendations.			
8/4/2015	No new recommendations.			
7/28/2015	No new recommendations.			
7/14/2015	No new recommendations.			
6/30/2015	No new recommendations.			
6/23/2015	No new recommendations.			
6/16/2015	No new recommendations.			
6/9/2015	No new recommendations.			

KCOL Hydrographs (through Sunday midnight)

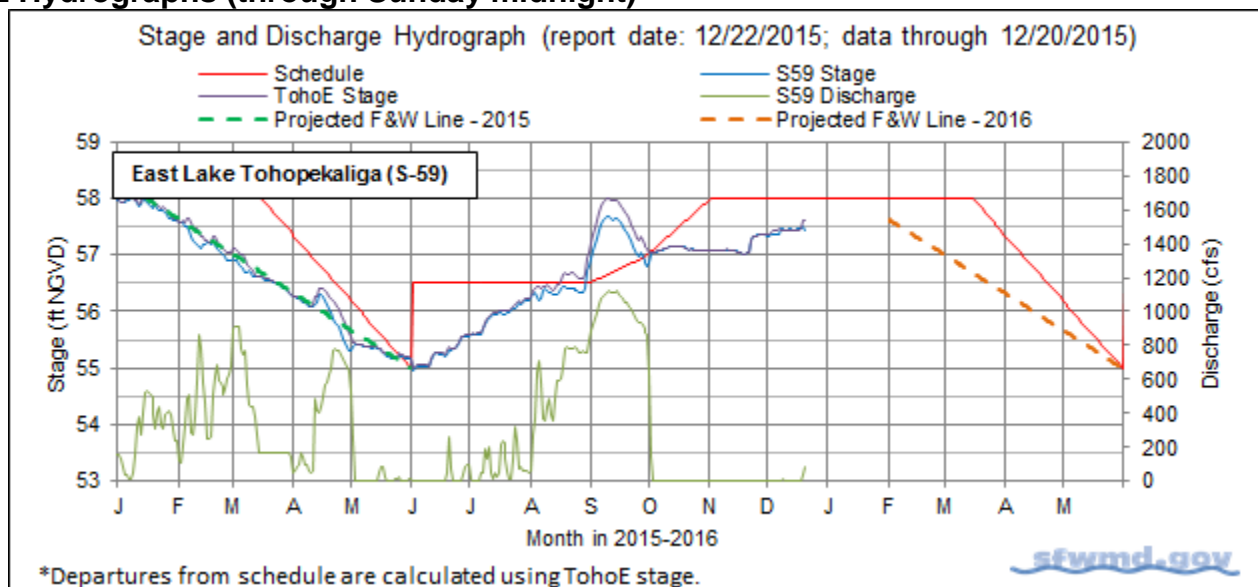


Figure 1.

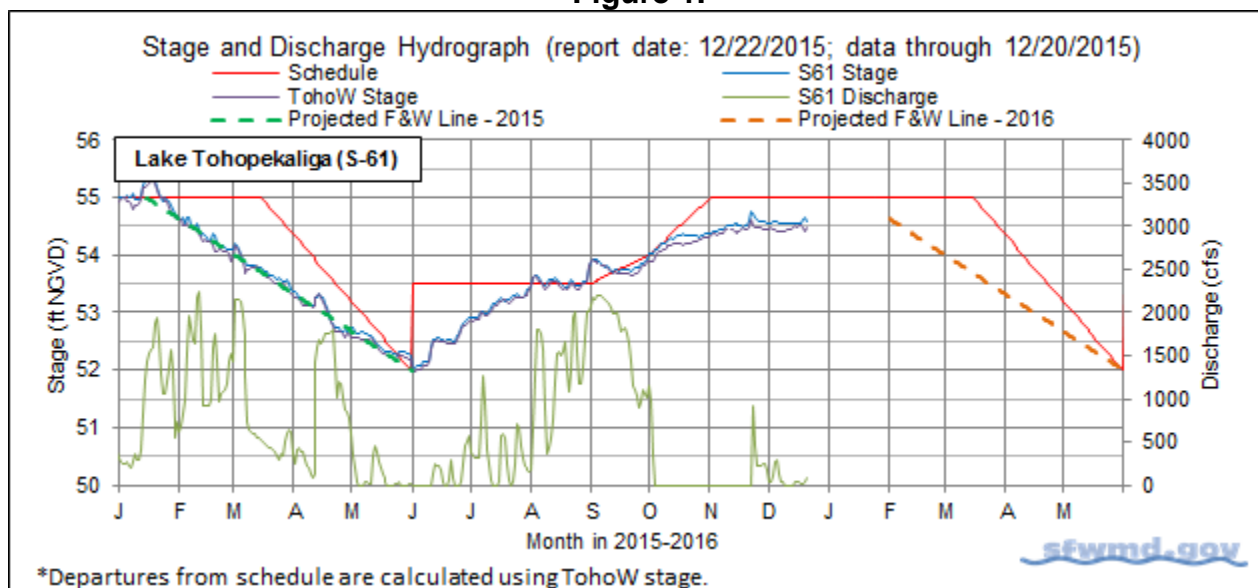


Figure 2.

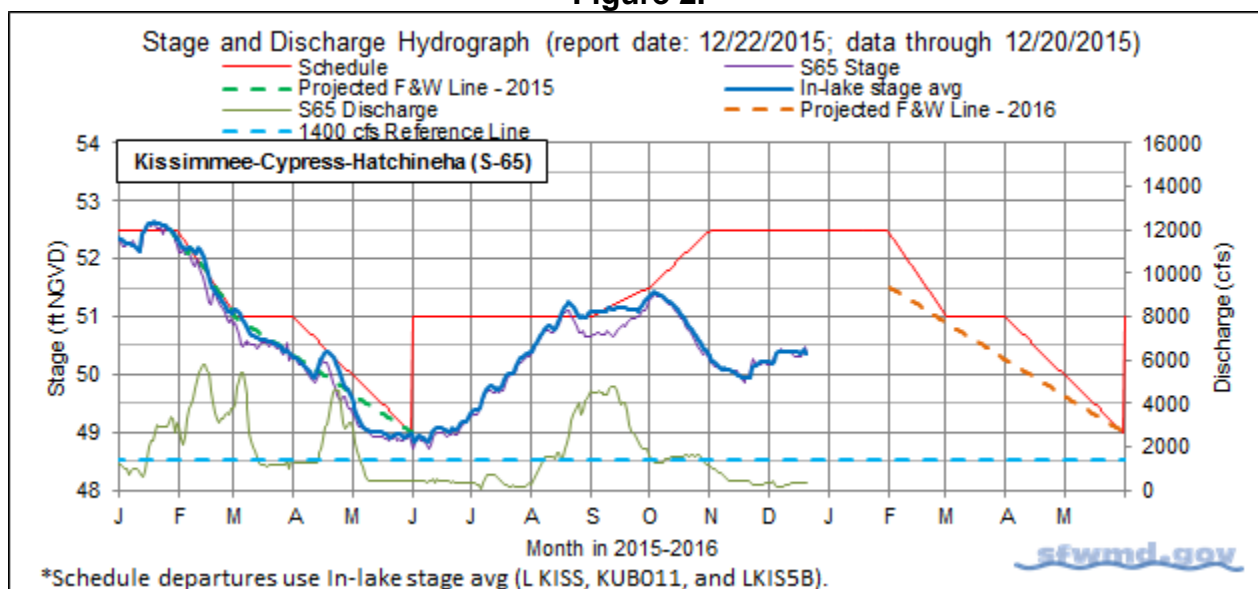


Figure 3.

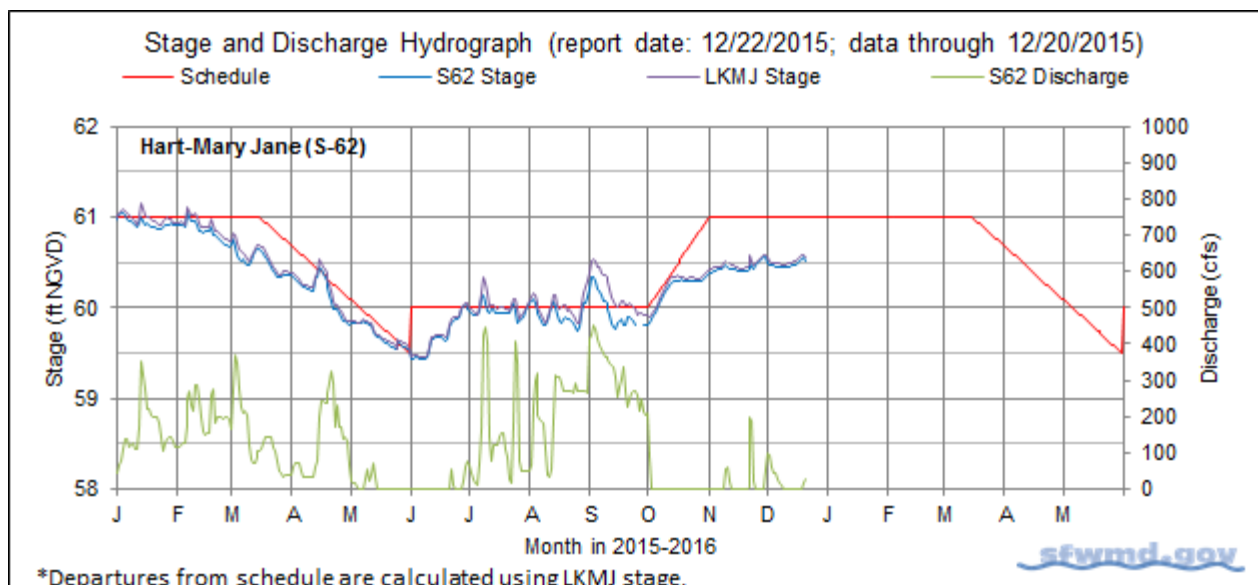


Figure 4.

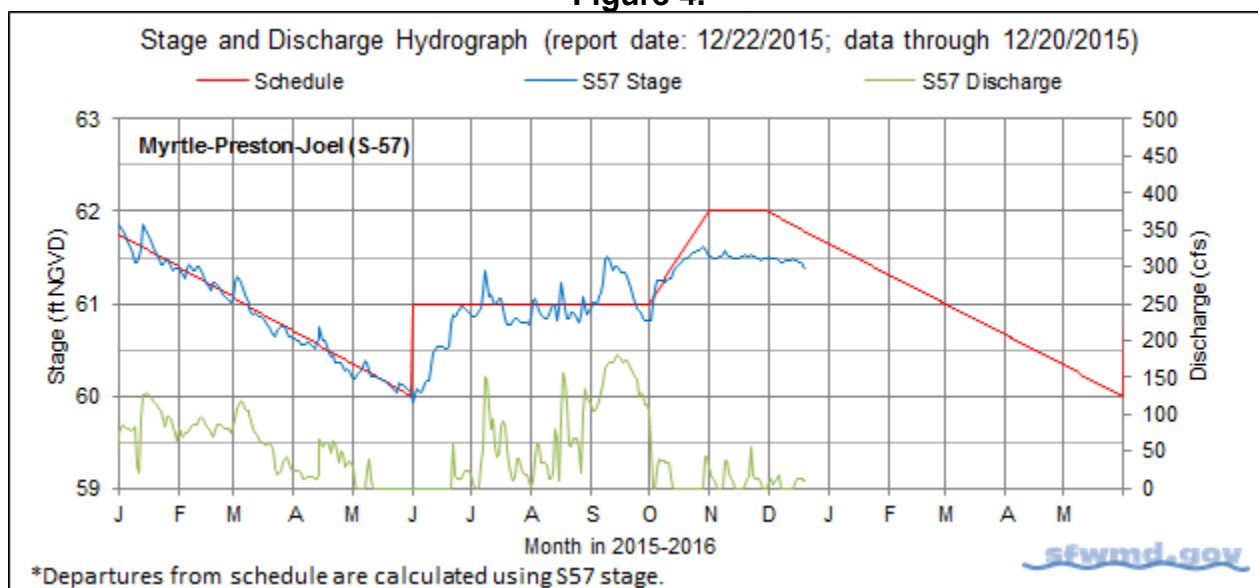


Figure 5.

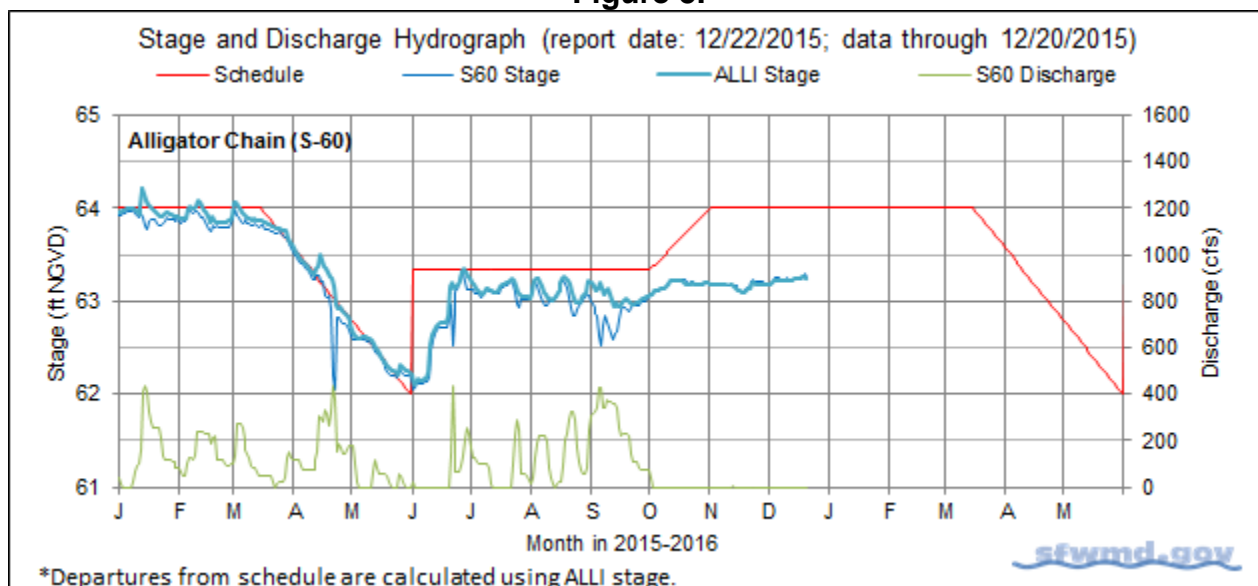


Figure 6.

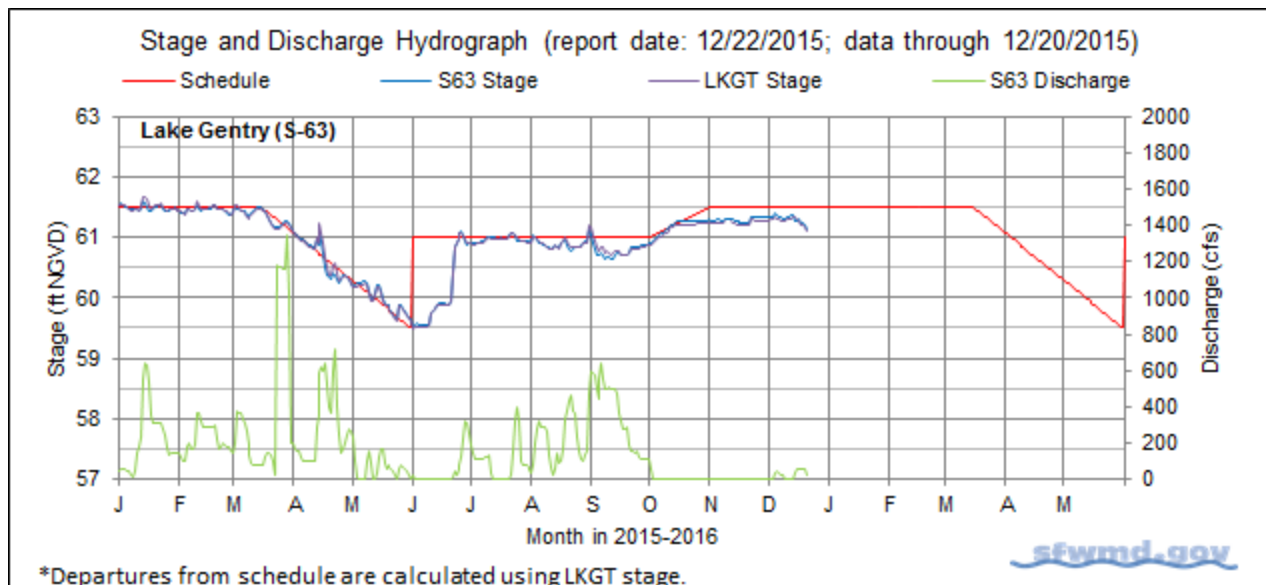


Figure 7.

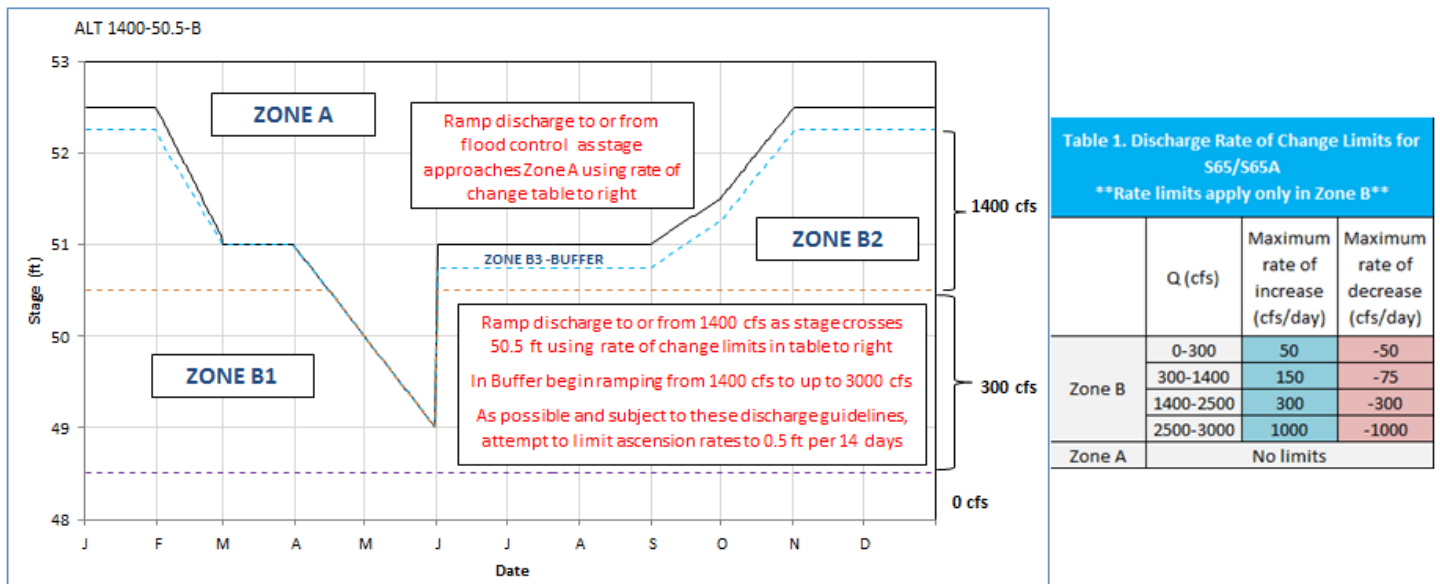


Figure 8a. S65 discharge plan for Wet Season 2015 and November 2015 – January 2016. F&W recession line to begin February 1 2016 (recession rate to be determined).

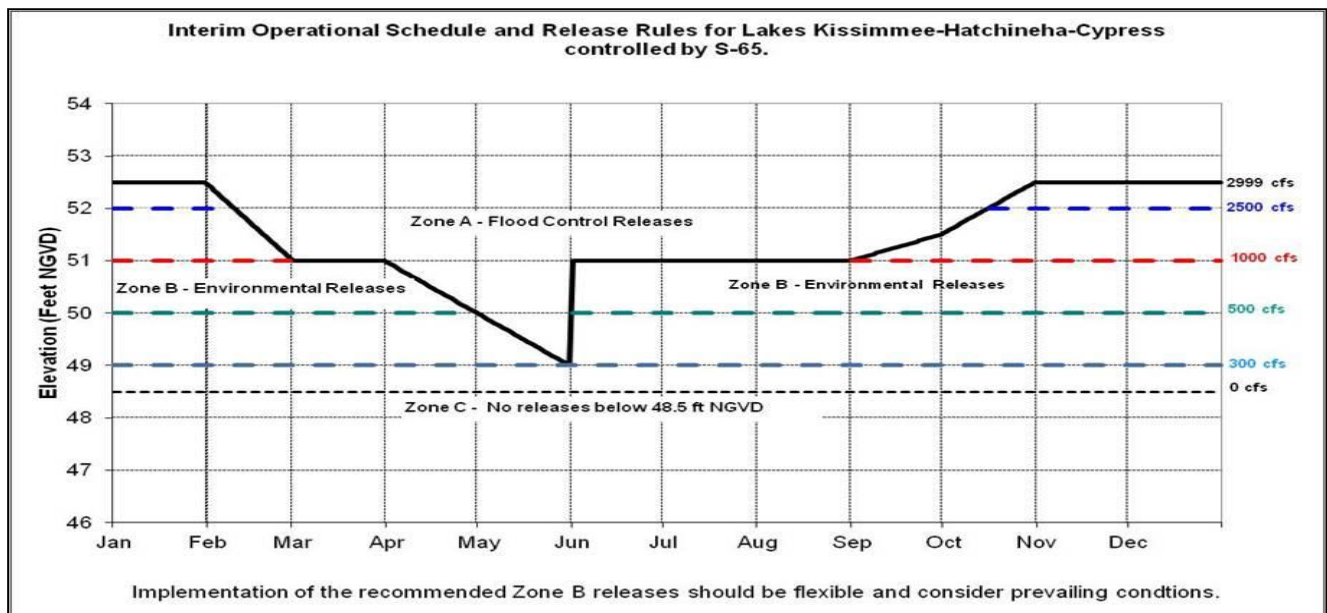


Figure 8b. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

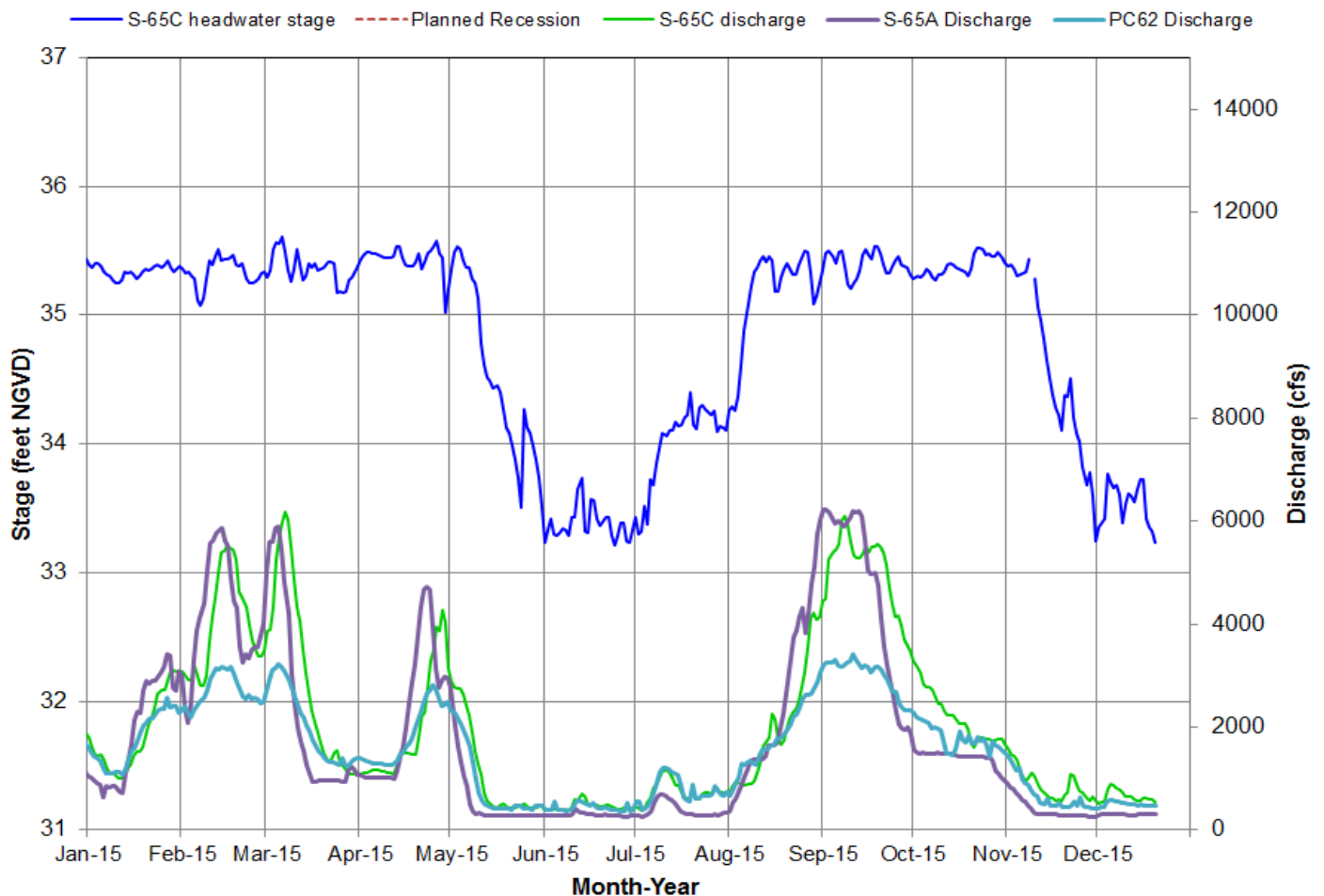


Figure 9. S-65C headwater stage in relation to discharge at S-65C, S-65A, and PC62.

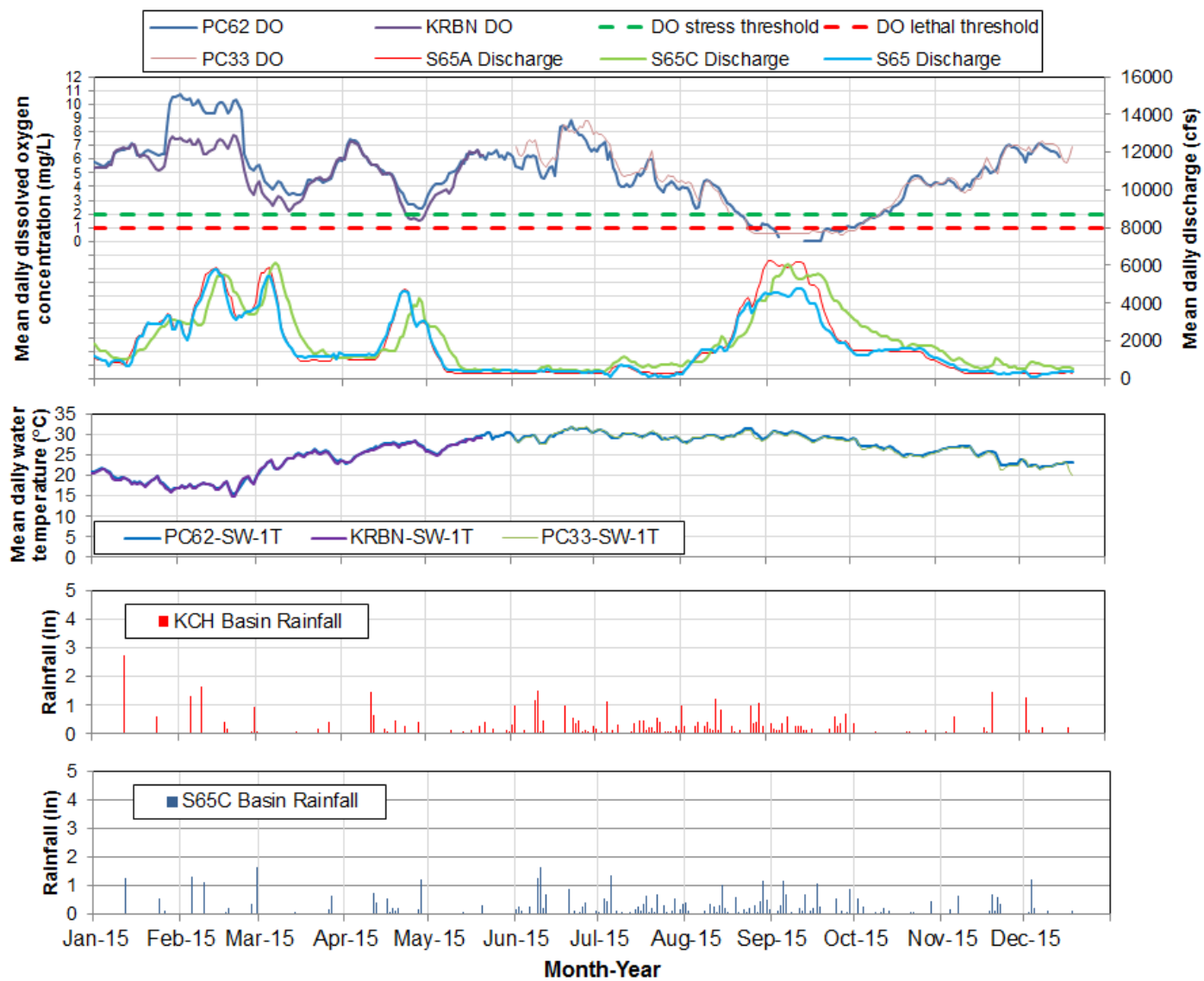
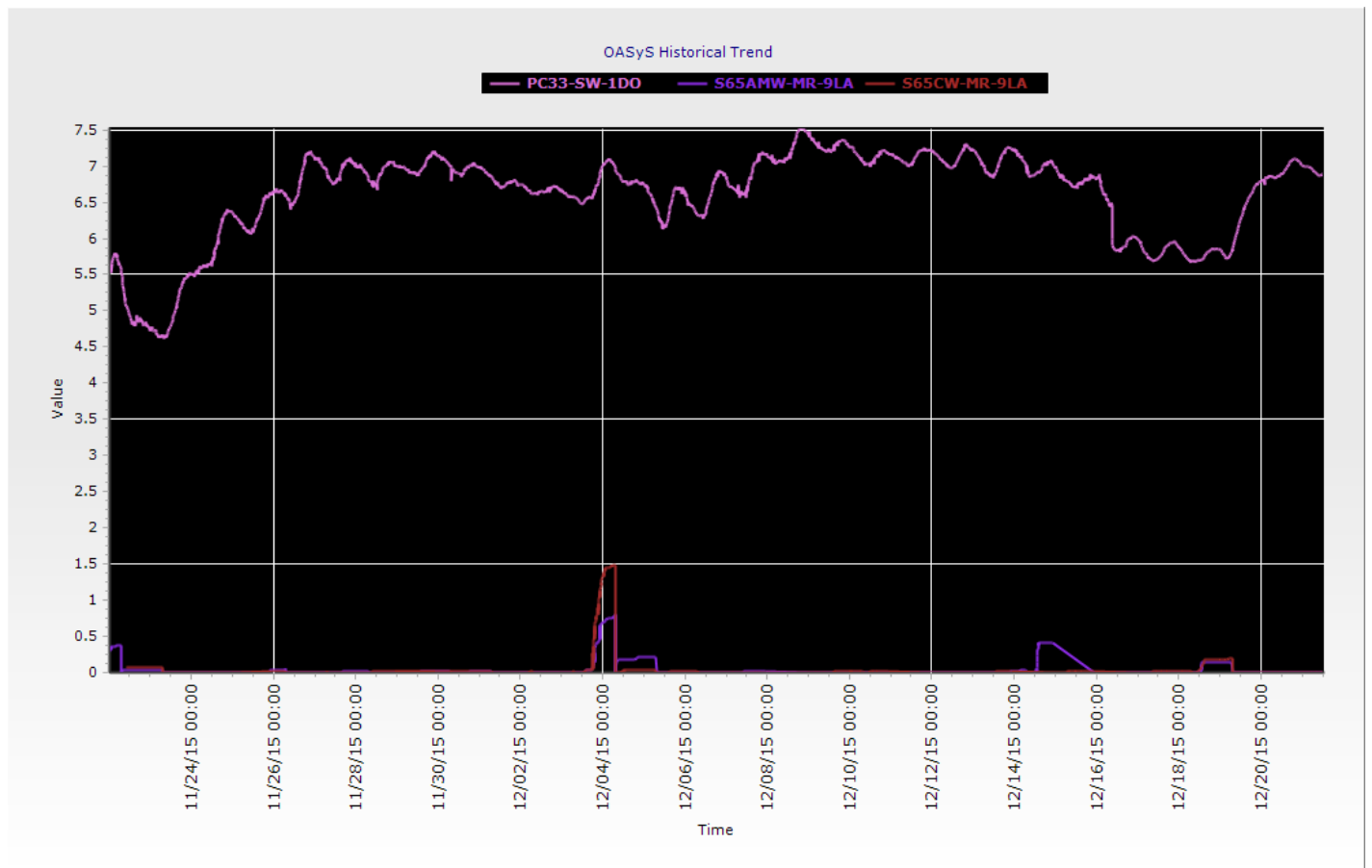


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.



Insert A. Phase I river channel Dissolved Oxygen (measured at 15 minute intervals) and rainfall at S65A and S65C.

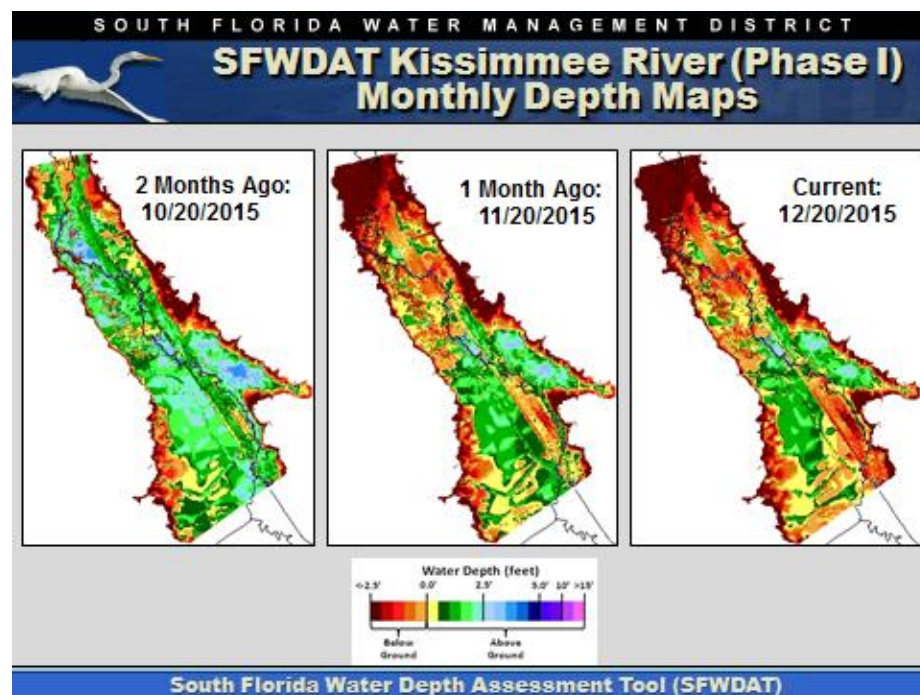


Figure 11. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.

Kissimmee River Hydrographs

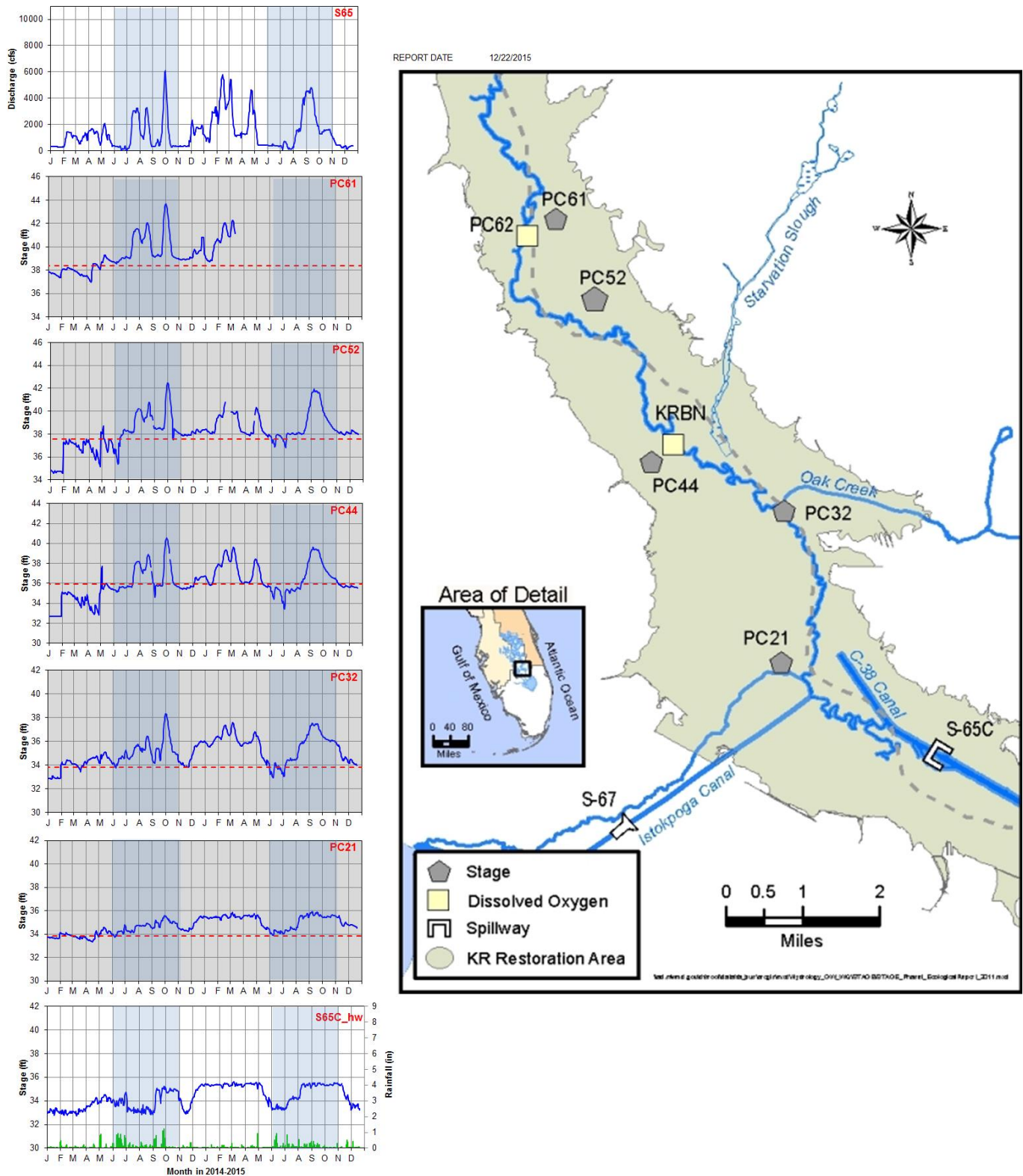


Figure 12. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2013. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated). Dashed lines are ground elevations.



Figure 13. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 14.74 feet NGVD for the period ending at midnight on December 21, 2015. Lake stage decreased by 0.04 feet over the past week. The Lake is now 0.30 feet higher than it was a month ago and 0.52 feet lower than it was a year ago (Figure 1). The Lake is in the Low Flow Sub-band (Figure 2). According to RAINДАР, 0.29 inches of rain fell directly over the Lake during the past seven days. Similar amounts of rain fell in the east, south and portions of the northern Lake Okeechobee watershed, with slightly higher amounts falling in the west and portions of the northern watershed near the Lake. (Figure 3).

Based on USACE reported values, current Lake inflow is approximately 1543 cfs, consisting of flows as indicated below. There is backpumping occurring at C5; water is being sent into the Nicodemus Slough project.

Structure	Flow cfs
S65E	488
S154	81
S84 & 84X	586
S71	219
S72	0
C5	-139
S191	0
S133 PUMPS	0
S127 PUMPS	60
S129 PUMPS	0
S131 PUMPS	0
S135 PUMPS	0
Fisheating Creek	248
S2 Pumps	0
S3 Pumps	0
S4 Pumps	0

Current Lake outflow is approximately 1774 cfs exiting through S77 (1648 cfs) and to the L8 canal through Culvert 10A (126 cfs). Corrected evapotranspiration this past week was equivalent to an outflow of 1169 cfs.

Change in elevation equivalents and average weekly flows for major structures are presented in Figure 4.

Based on the Lake Okeechobee wading bird habitat suitability index, there are currently approximately 54,941 acres of suitable foraging habitat on the Lake, a slight increase over last week (Figure 5). Pre and post Moonshine Bay area cattail burn satellite images are in Figure 6.

MODIS satellite imagery indicated a small area of potential algal bloom conditions in the west portion of the nearshore region. Cloud cover obscured most of the littoral-nearshore interface area (Figure 7).

Water Management Recommendations

The winter/spring Lake stage recession has recommenced which should provide positive recession consequences as the peak of wading bird and snail kite breeding seasons draw closer. Future short-

term recommendations will depend in large measure on the near-term rainfall patterns and amounts. Any activities which contribute to the continuation of the slow dry season recession would be ecologically beneficial.

The operational goal continues to be to maintain a small but steady decrease in water levels not to exceed 0.4 feet per month (0.09 feet/week) to achieve a Lake stage of approximately 12.5 feet NGVD by the end of the dry season and avoid further reversals in Lake stage.

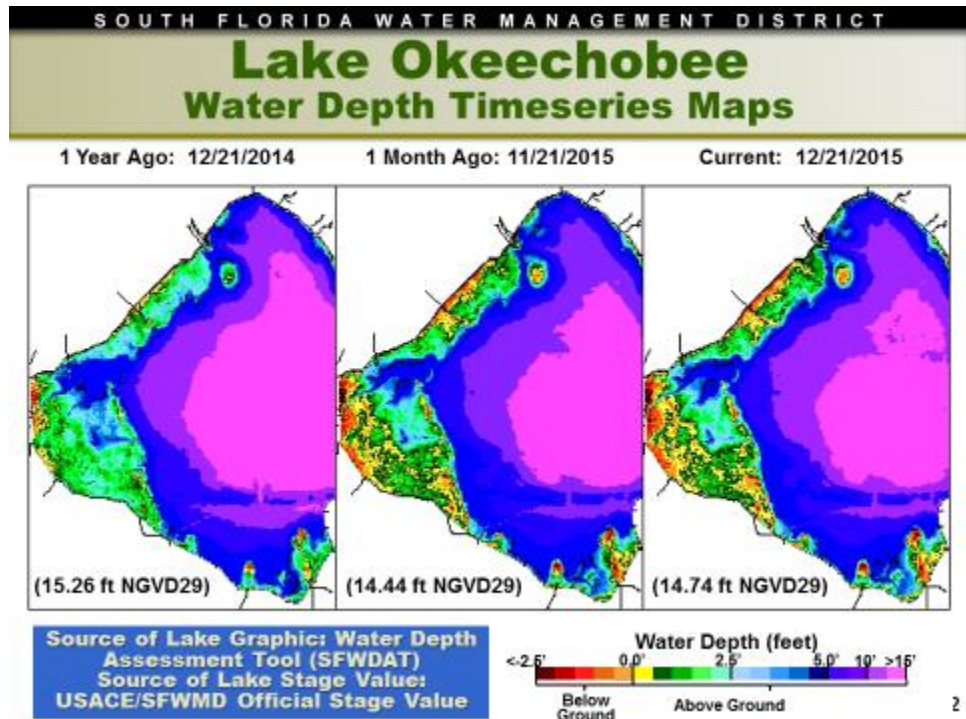


Figure 1

Lake Okeechobee Water Level History and Projected Stages

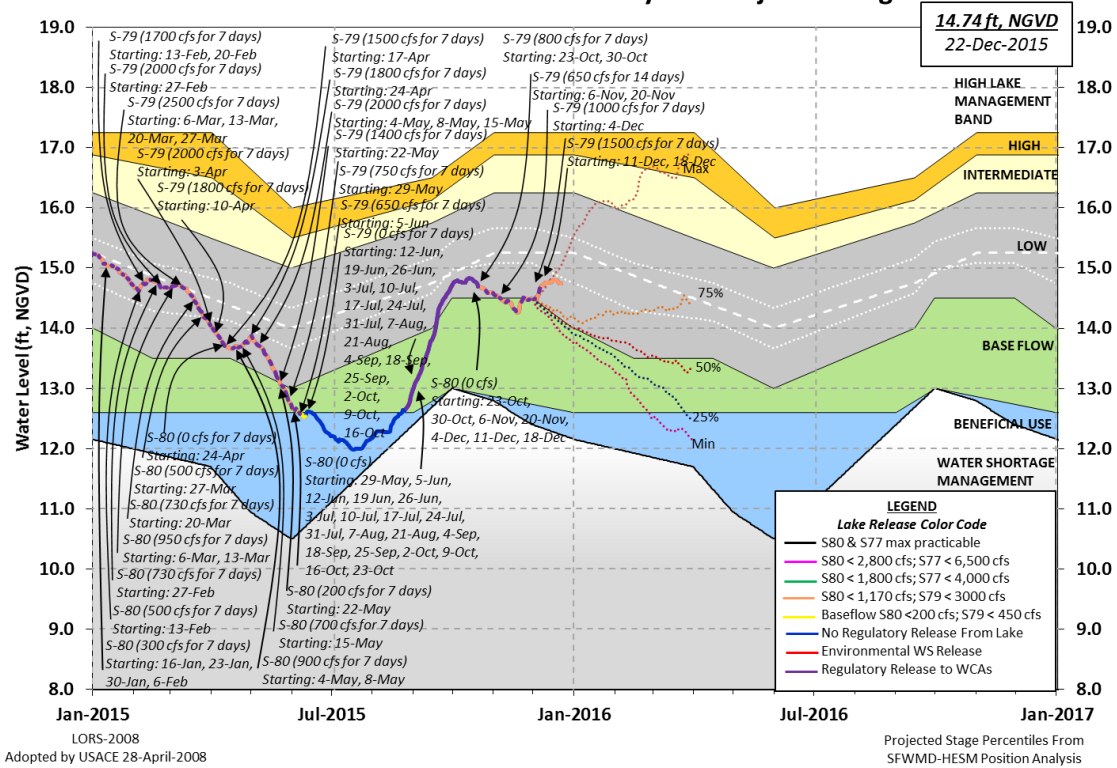


Figure 2

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 0630 EST, 12/15/2015 THROUGH: 0630 EST, 12/22/2015

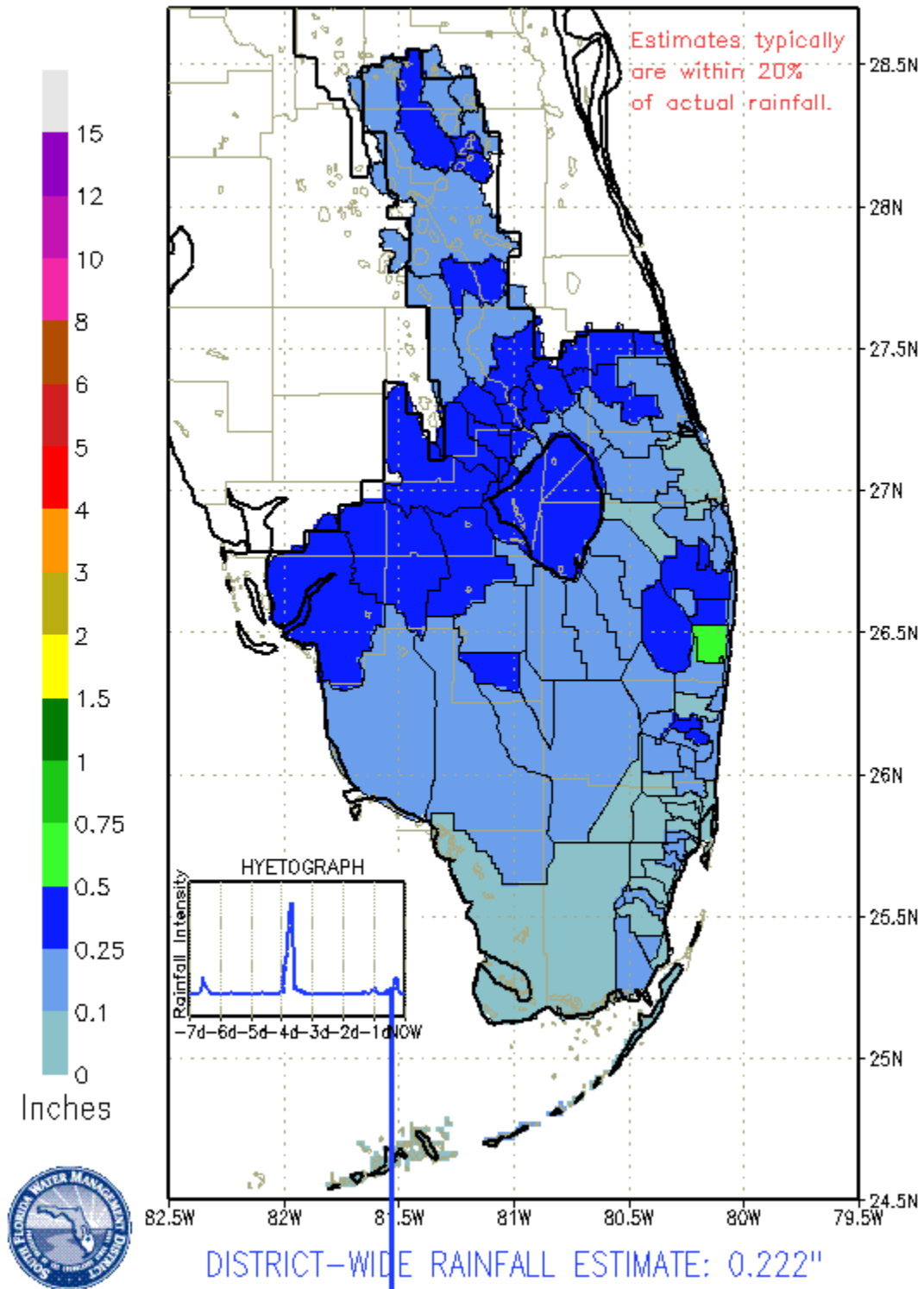


Figure 3

INFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S65E	592	0.020
S71 & 72	277	0.009
S84 & 84X	464	0.015
Fisheating Creek	598	0.020
Rainfall	N.A.	0.005
OUTFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S77	1097	0.037
S308	0	0.000
S351	0	0.000
S352	0	0.000
S354	0	0.000
L8	190	0.006
ET	1169	0.039

Figure 4

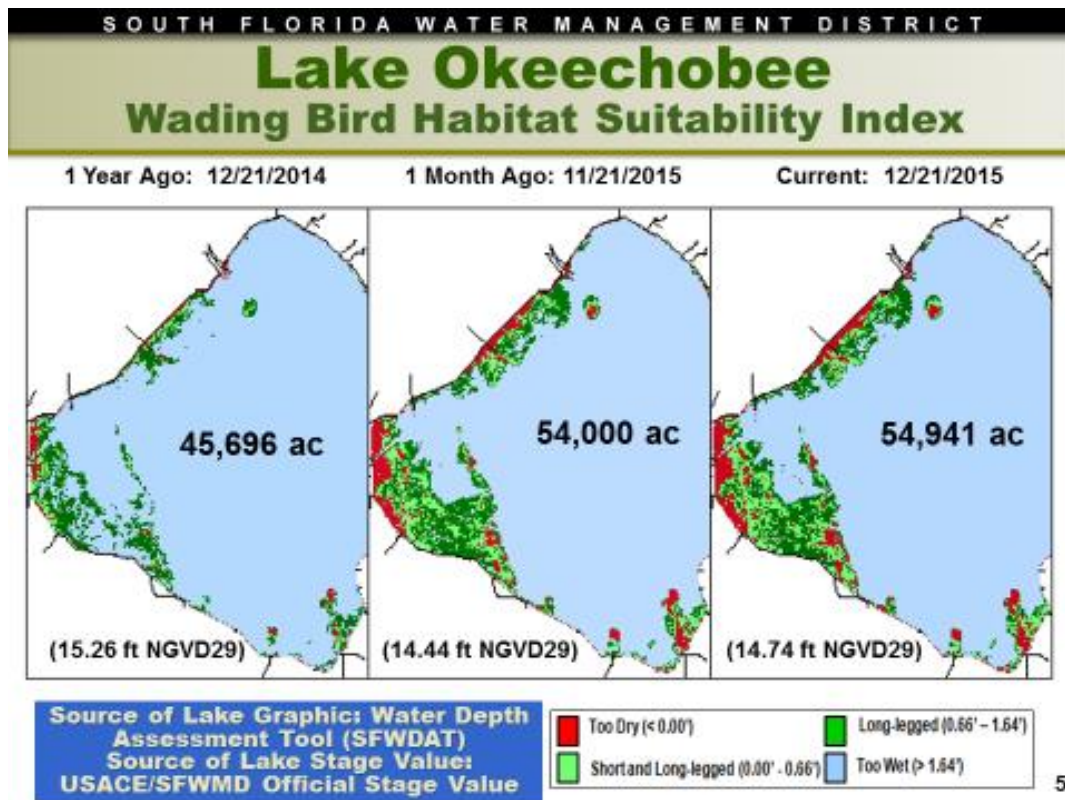


Figure 5

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee Vegetation Management

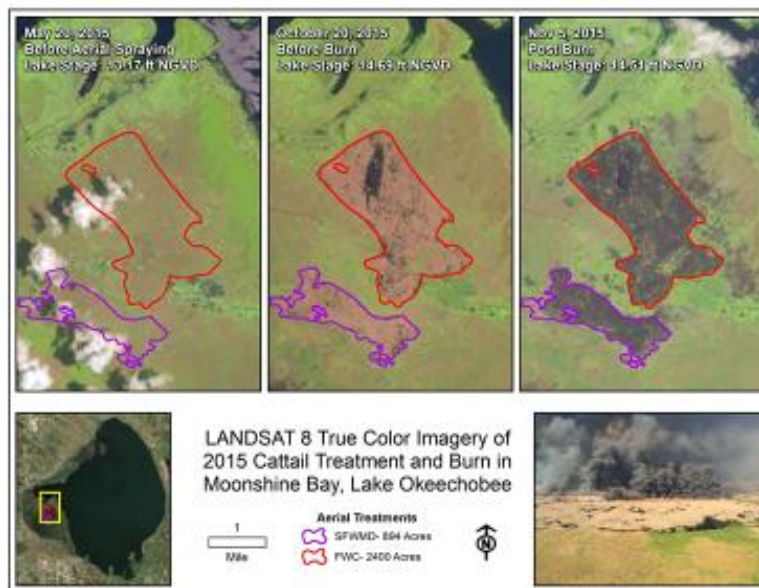


Figure 6

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee Algal Blooms

Unvalidated and Experimental Data

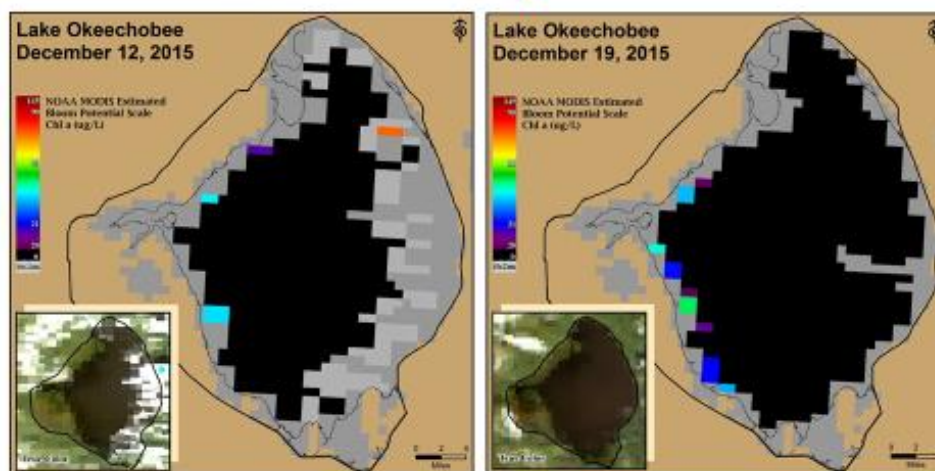


Figure 7

Lake Istokpoga

Lake Istokpoga stage is 39.34 feet NGVD today and is currently 0.16 feet below its regulation schedule of 39.50 feet NGVD, which remains at peak high pool (Figure 8). Average flows into the Lake from

Arbuckle and Josephine creeks were 302 and 76 cfs respectively, an overall decrease of 21% compared to the preceding week. Average discharge from S68 and S68X this past week was 483 cfs, an increase of 62% compared to the preceding week. According to RAINDAR, 0.21 inches of rain fell in the Lake Istokpoga watershed during the past seven days.

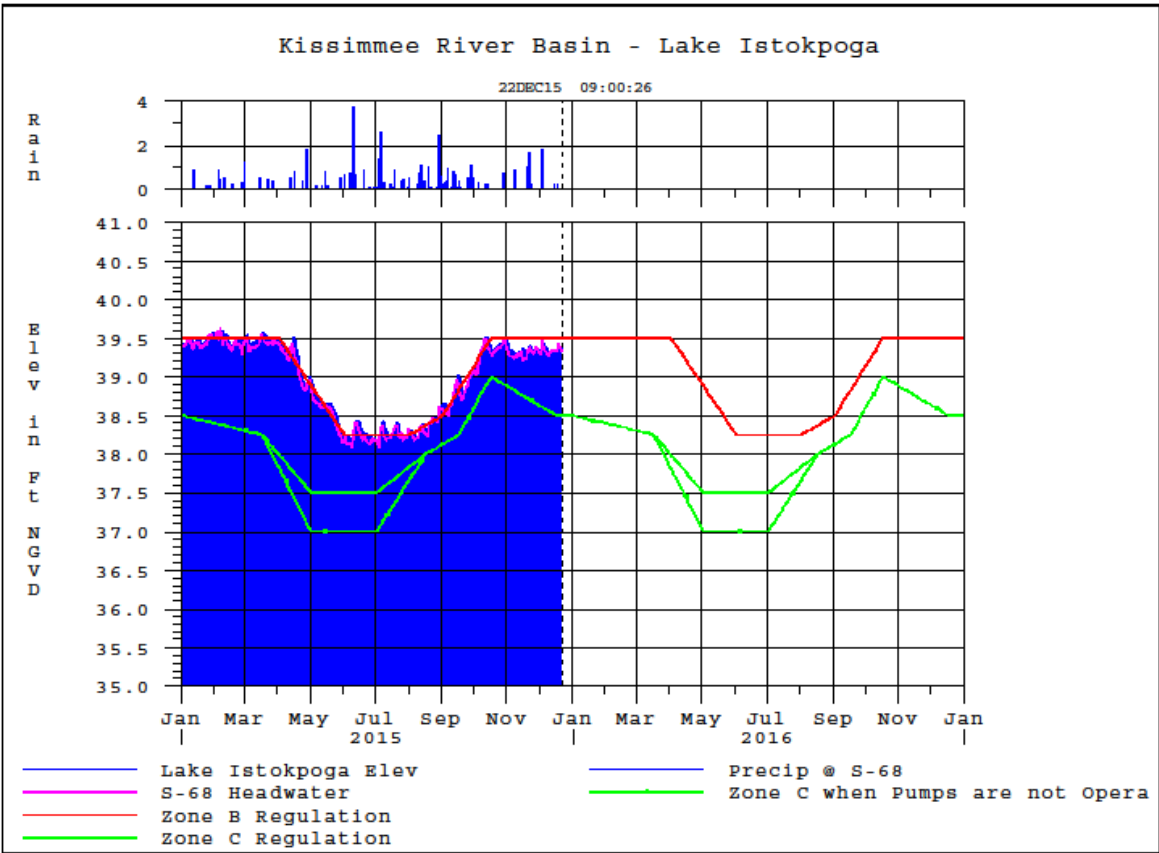


Figure 8

ESTUARIES

St. Lucie Estuary

Over the past week, provisional flows averaged 147 cfs at S-80, 0 cfs at S-308, 168 cfs at S-49 on C-24, 138 cfs at S-97 on C-23, and 150 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 155 cfs (Figures 1 and 2). Total inflow averaged about 760 cfs last week and 1532 cfs over last month.

Over the past week, salinity increased throughout the estuary (Table 1, Figures 3 and 4). The seven-day moving average salinity of the water column was 7.6 at the US1 Bridge. Salinity conditions in the middle estuary remained in the fair range for the adult eastern oyster.

Table 1. Seven-day average salinity at three monitoring stations in the St. Lucie Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

Sampling Site	Surface	Bottom	Envelope
HR1 (N. Fork)	3.7 (3.4)	NR ² (NR)	NA ¹
US1 Bridge	8.1 (5.7)	10.3 (8.5)	10.0-26.0
A1A Bridge	18.4 (13.9)	25.0 (22.5)	NA

¹Envelope not applicable, ²Not Reporting

Caloosahatchee Estuary

During the past week, provisional flows averaged approximately 945 cfs at S-77, 957 cfs at S-78, and 1607 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 804 cfs (Figures 5 and 6). Total inflow averaged 2411 cfs last week and 2454 cfs over last month.

Over the past week, surface salinity decreased throughout the estuary (Table 2, Figures 7 & 8). The seven-day average salinity values are within the good range for oysters at Cape Coral, Shell Point, and Sanibel (Figure 9). The 30-day moving average surface salinity is 2.74 at Val I-75 and 6.8 at Ft. Myers. Salinity conditions at Val I-75 are in the good range for tape grass, and are forecasted to remain so in the following two weeks even without discharges at S-79 (Figure 10).

Table 2. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for tape grass (*Vallisneria americana*) at Val I-75 and for adult eastern oysters (*Crassostrea virginica*) elsewhere.

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	0.6 (1.0)	0.6 (1.0)	NA ¹
*Val I75	1.2 *(1.4*)	1.7 *(2.3*)	0.0-5.0 ²
Ft. Myers Yacht Basin	4.4 (5.4)	5.2 (7.5)	NA
Cape Coral	11.5 (11.6)	13.2 (13.3)	10.0-30.0
Shell Point	~22.7 (~22.0)	23.9 (24.1)	10.0-30.0
Sanibel	27.7 (27.6)	28.9 (28.5)	10.0-30.0

¹Envelope not applicable, ²Envelope is based on a 30-day average.

*Val I75 is temporarily offline due to bridge construction.

Salinity values are estimated using models developed for this site.

Monitoring data collected by the River, Estuary and Coastal Observing Network of Sanibel-Captiva Conservation Foundation using continuous sensors are summarized in Table 3 as concentration ranges of Chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 3. Weekly ranges of Chlorophyll *a* (a measure of algal biomass) and dissolved oxygen concentrations at three monitoring stations maintained by the Sanibel-Captiva Conservation Foundation.

	RECON Monitoring Stations		
	Beautiful Island	Ft. Myers	Shell Point
Chlorophyll <i>a</i> (µg/l)	5.0 – 5.5	4.1 – 7.5	1.5 – 4.1
Dissolved Oxygen (mg/l)	5.3 – 7.8	6.0 – 8.8	4.8 – 7.1

The Florida Fish and Wildlife Research Institute reported on December 18, 2015, that there were background to medium concentrations of *Karenia brevis* in 18 samples collected in, along, and offshore of Lee County.

Water Management Recommendations

Lake Okeechobee's water level is within the Low Flow Operational Sub-band; the tributary hydrological conditions are Normal; and the seasonal and multi-seasonal forecasts are Wet and Wet, respectively. The Lake Okeechobee Regulation Schedule (LORS) recommends discharges to the Caloosahatchee of up to 3000 cfs at S-79 and to the St. Lucie of up to 1170 cfs at S-80.

Currently, the USACE is implementing a seven-day release averaging 1500 cfs at S-79 and 0 cfs at S-80, and there are no ecological benefits associated with additional releases from Lake Okeechobee. However, considering the current high Lake level and anticipated wetter than normal dry season under the influence of a strong El Niño, releases beyond this level under LORS guidance may be necessary. If such an increase is required, it is suggested that current releases be augmented by low amounts (about 300 cfs incremental changes) to avoid abrupt changes in flow and salinity conditions. Such releases, while helping reduce the risk of future high discharges associated with the strong El Niño, should be conducted in a pulse pattern to mitigate potential stratification and phytoplankton accumulation in the water column (Table 4).

Table 4. Schedules for 7-day pulse releases at S-80 and S-79

7-day pulses at S-80								
Day	200 cfs	300 cfs	400 cfs	500 cfs	650 cfs	800 cfs	950 cfs	1170 cfs
1	200	300	400	500	650	800	950	1290
2	600	700	800	900	1100	1200	1400	1800
3	300	500	650	800	900	1100	1200	1500
4	200	300	450	600	800	900	1100	1300
5	100	200	300	400	600	700	900	1000
6	0	100	200	300	400	600	700	800
7	0	0	0	0	100	300	400	500
7-day pulses at S-79								
Day	450 cfs	650 cfs	1000 cfs	1200 cfs	1500 cfs	2000 cfs	2600 cfs	3000 cfs
1	850	1150	1500	1700	2000	2500	3100	3500
2	1000	1400	1900	2100	2400	3100	3900	4300
3	700	900	1600	1800	2100	2600	3400	3800
4	300	600	900	1100	1400	1900	2500	2900
5	200	400	700	900	1200	1700	2300	2700
6	100	100	400	600	900	1400	2000	2400
7	0	0	0	200	500	800	1000	1400

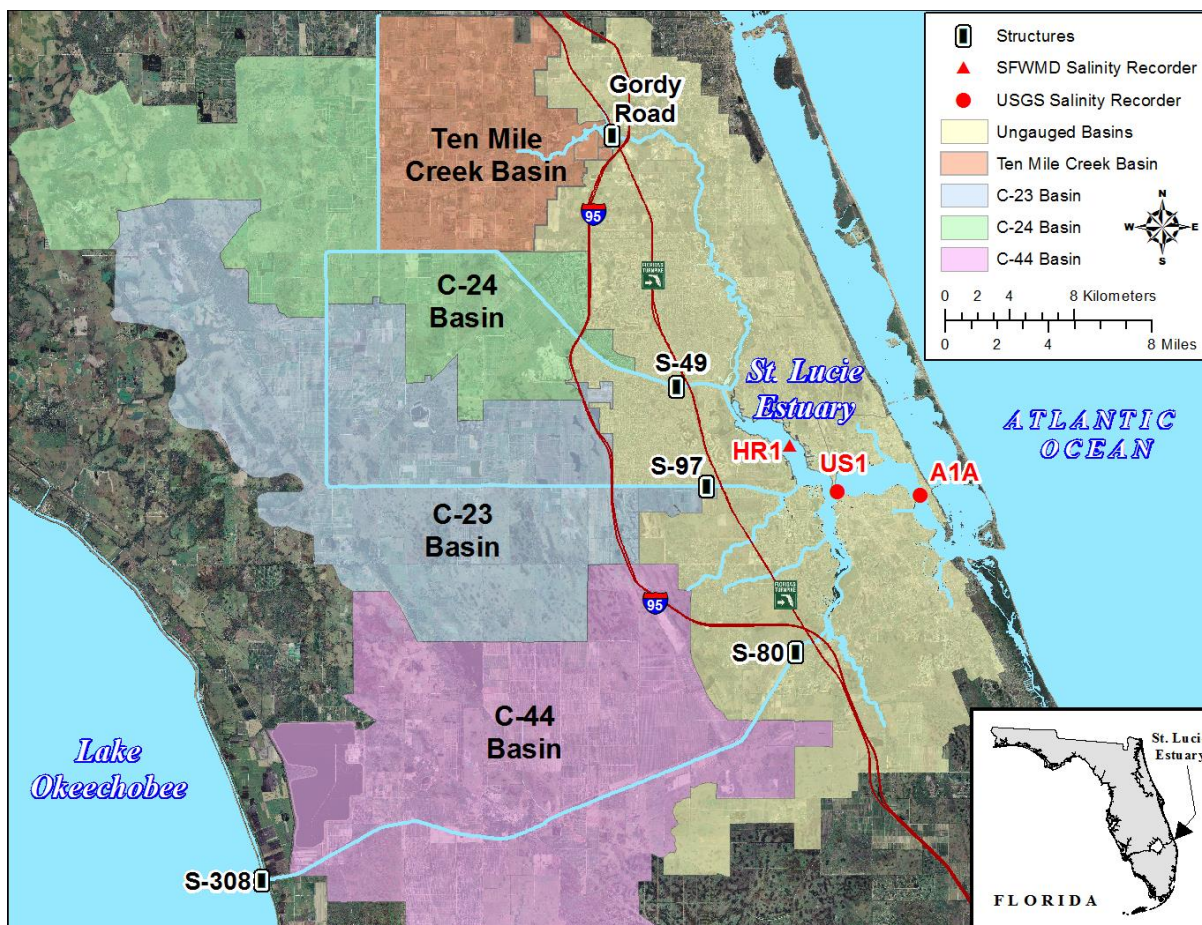


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

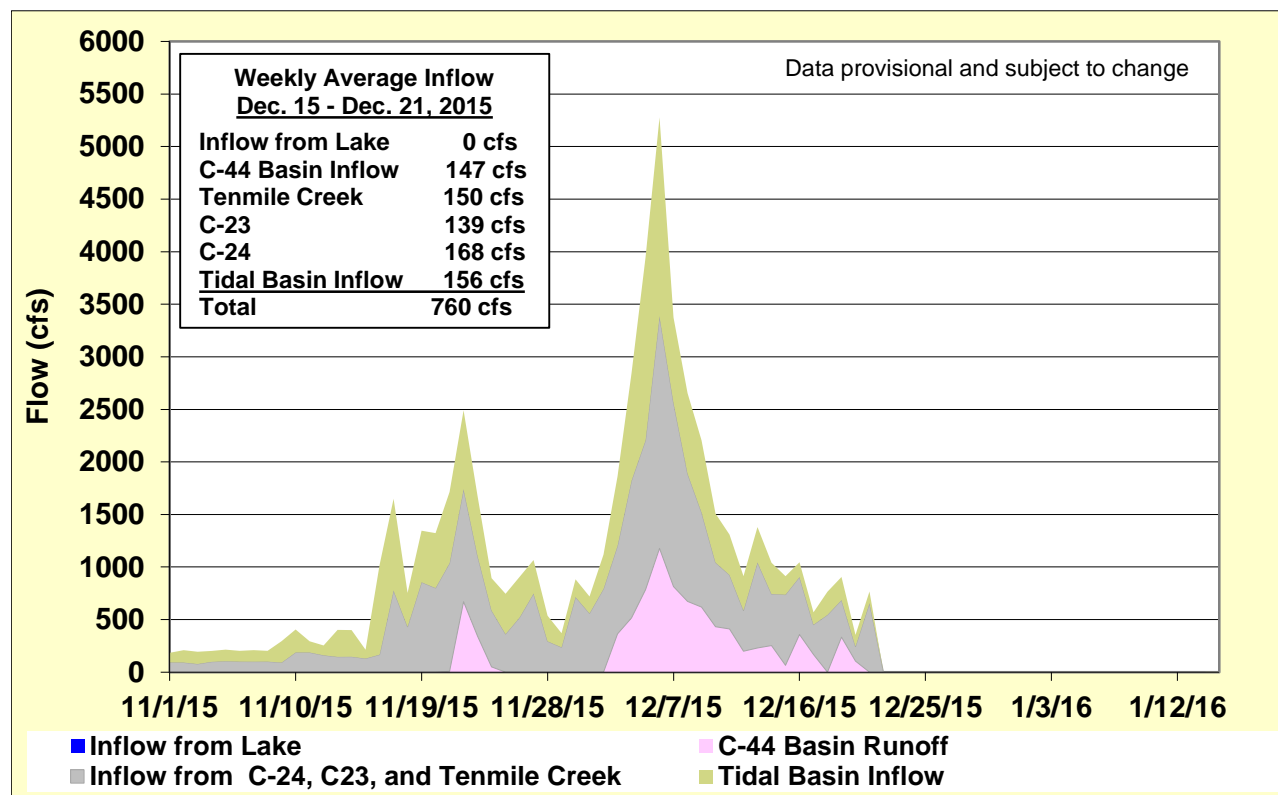


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

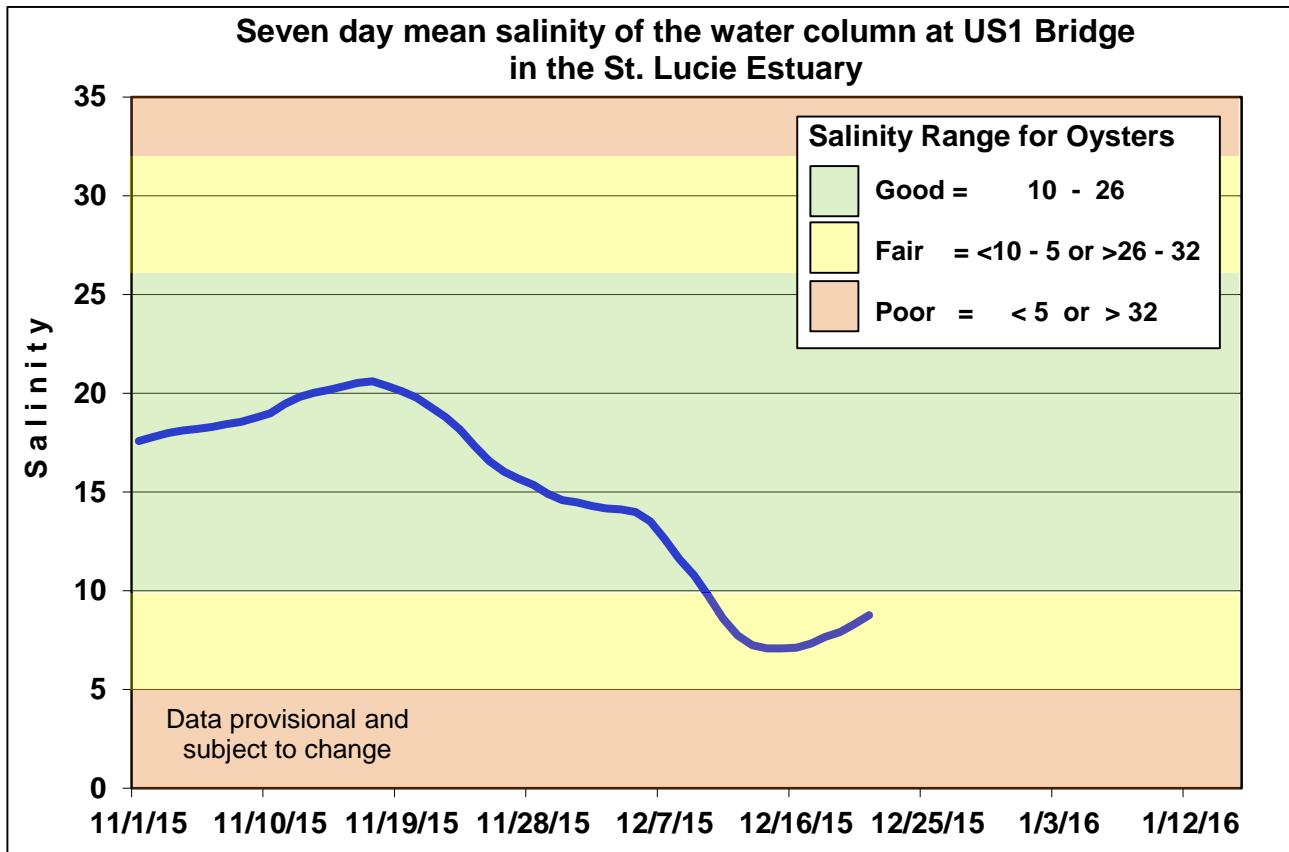


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

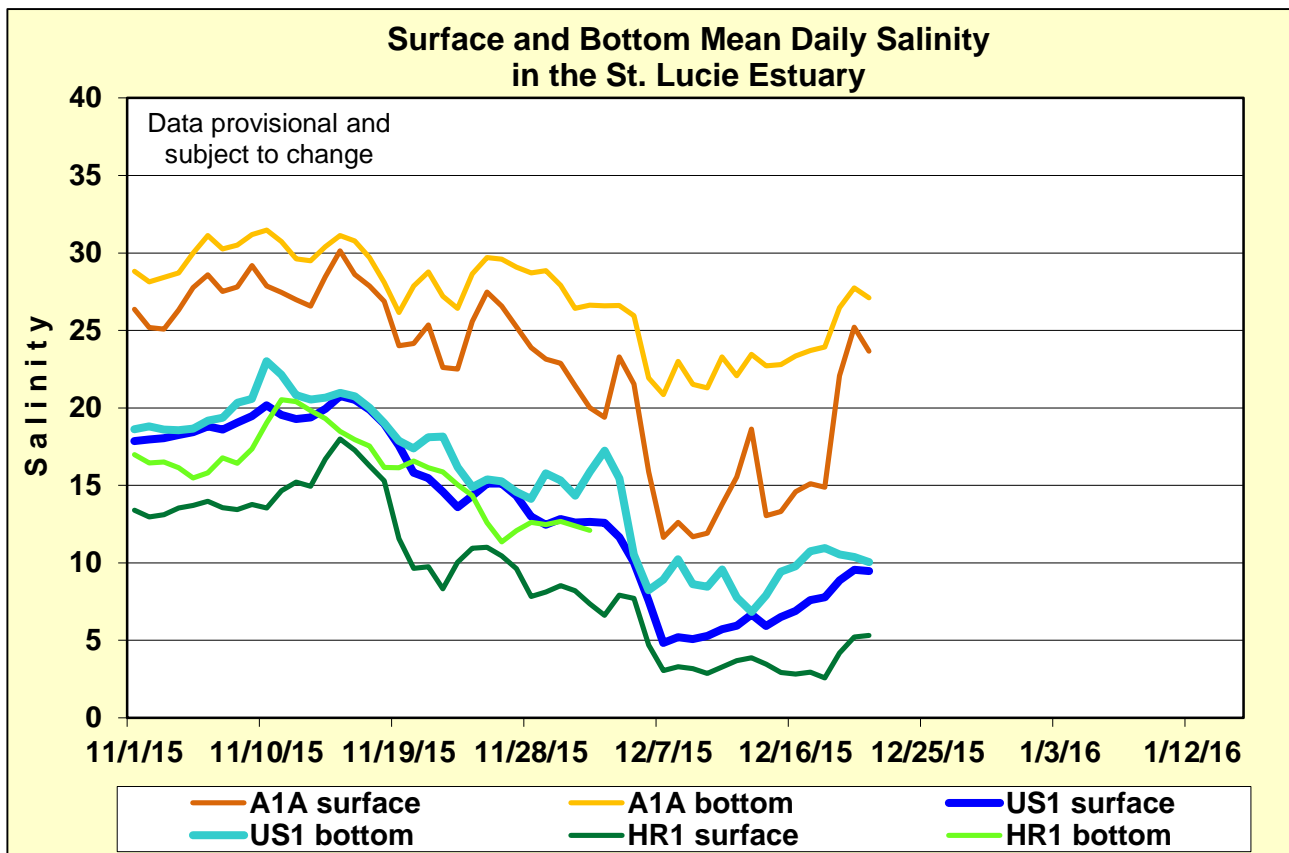


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

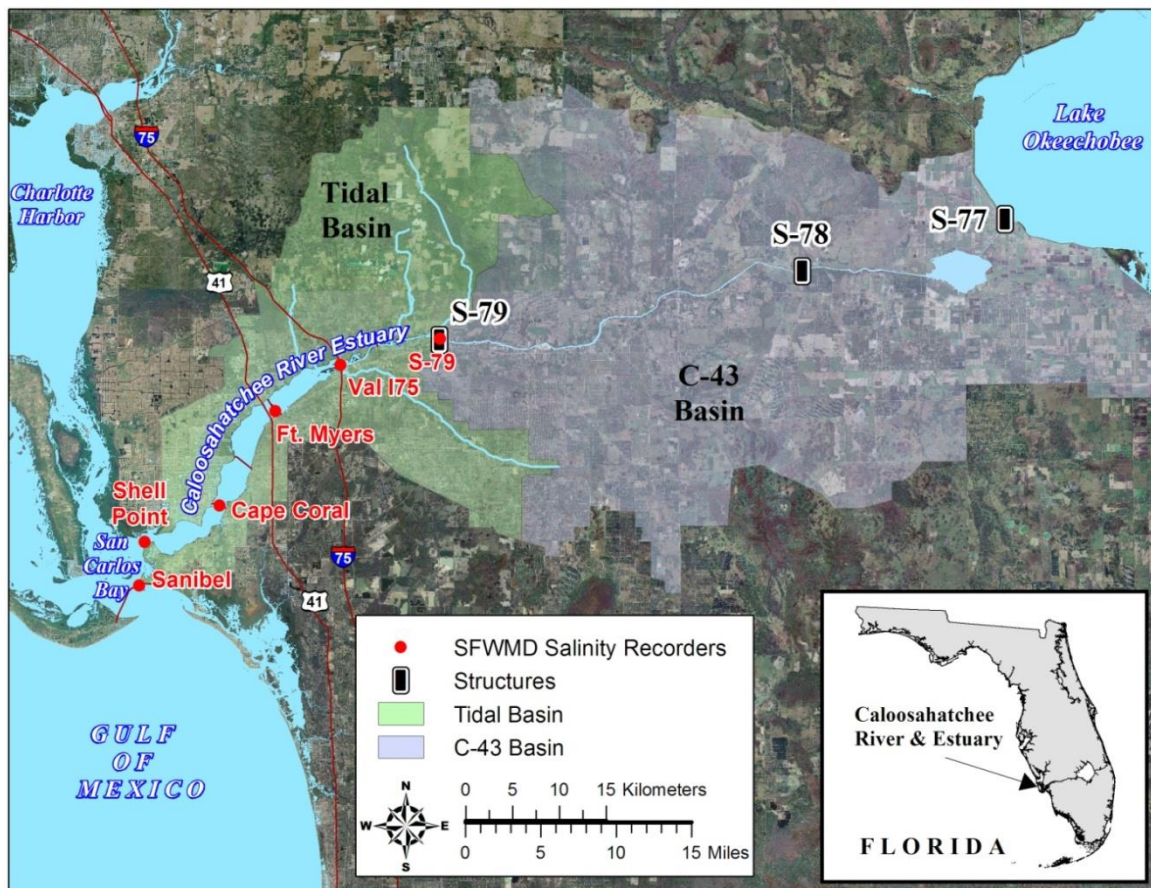


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

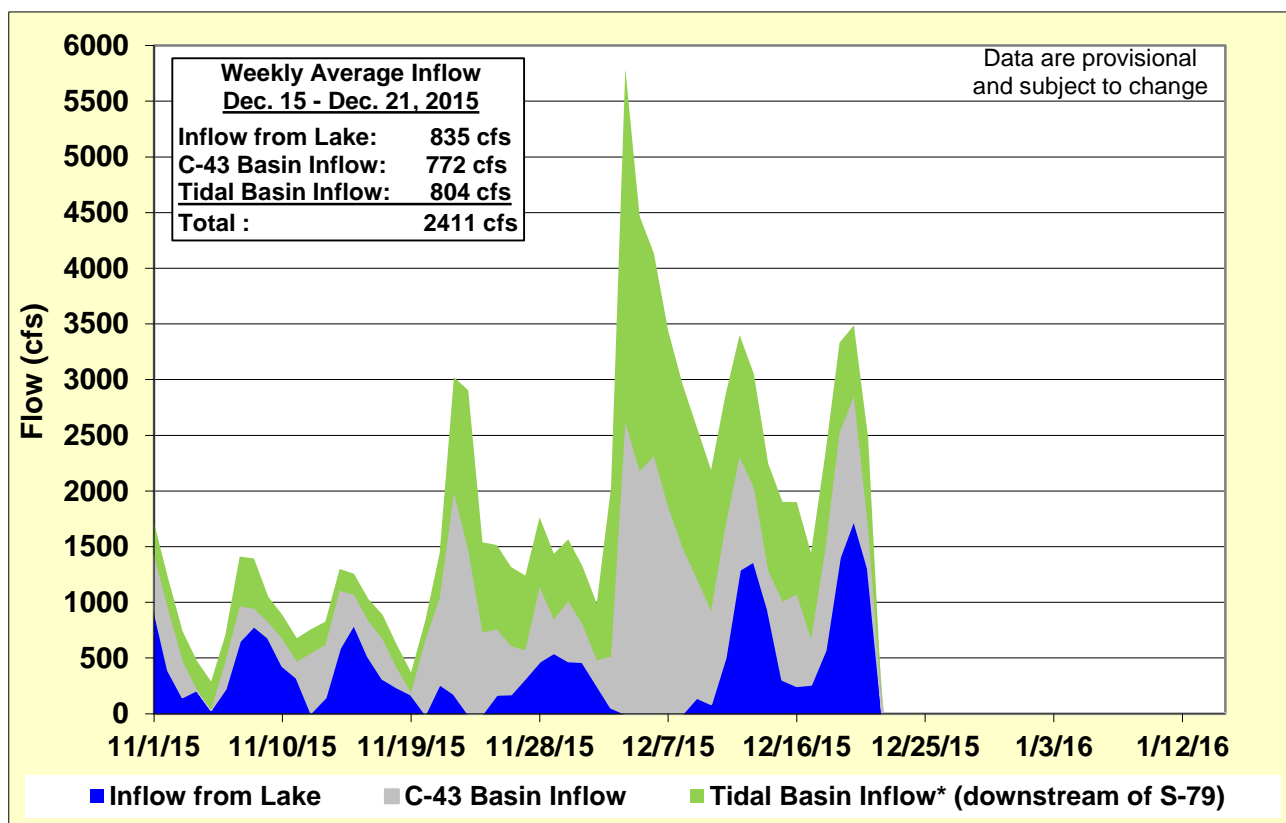


Figure 6. Surface freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

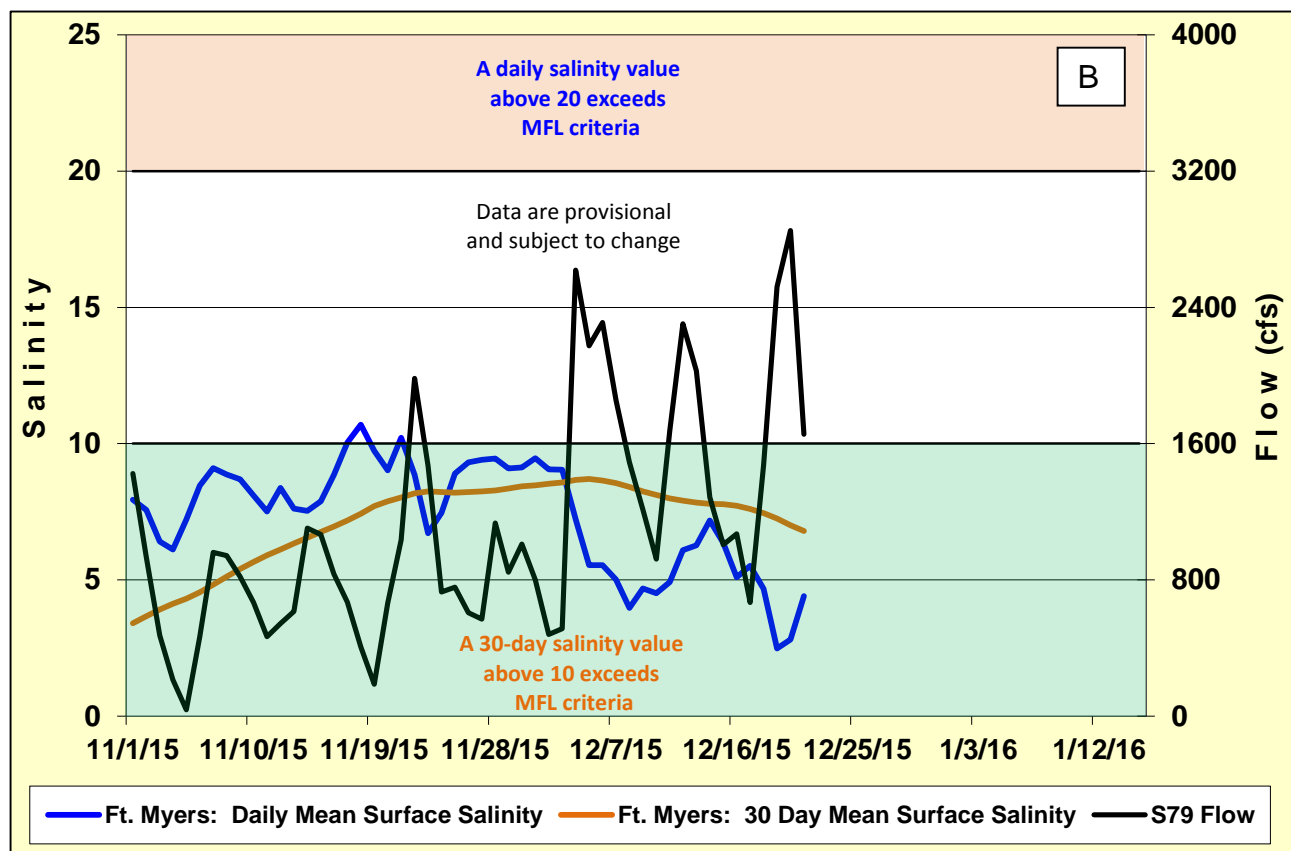
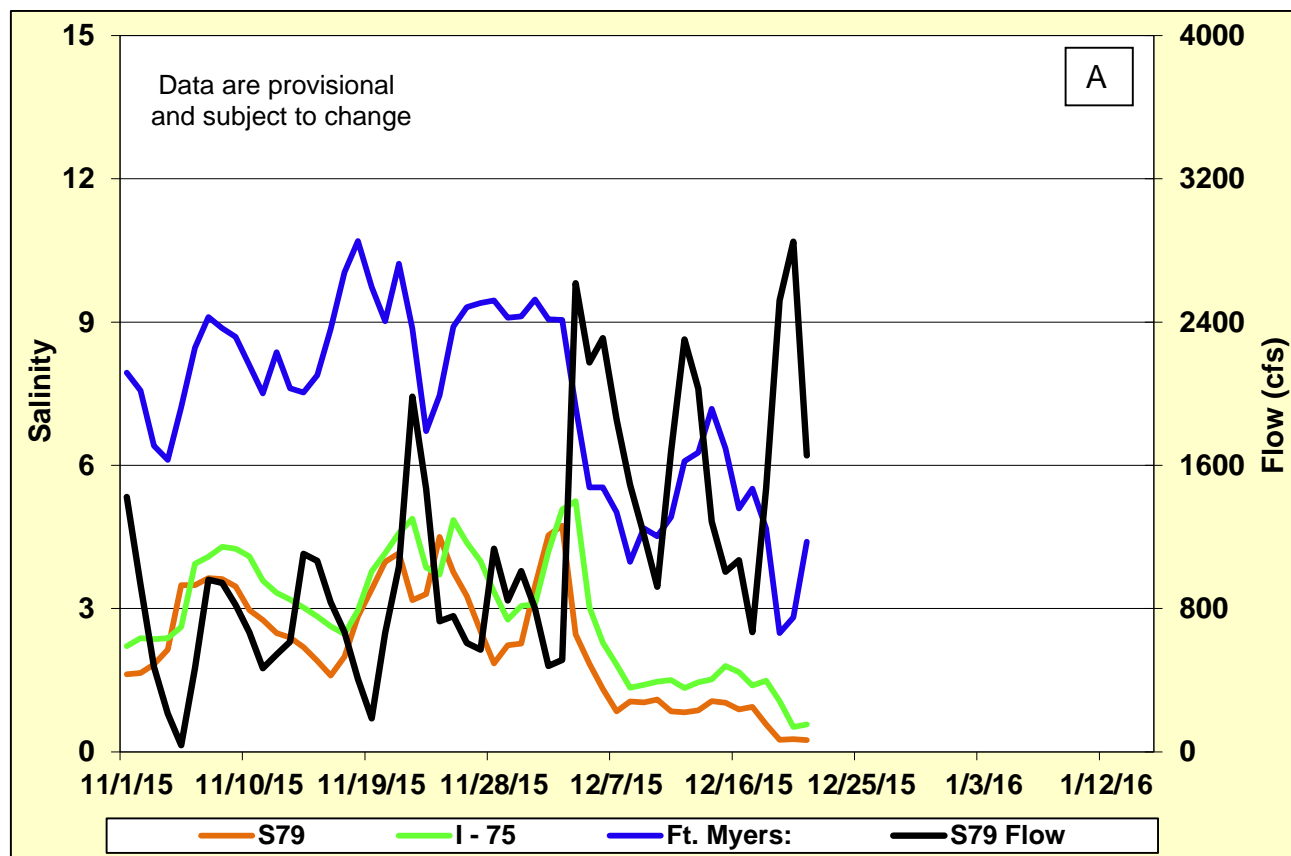


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

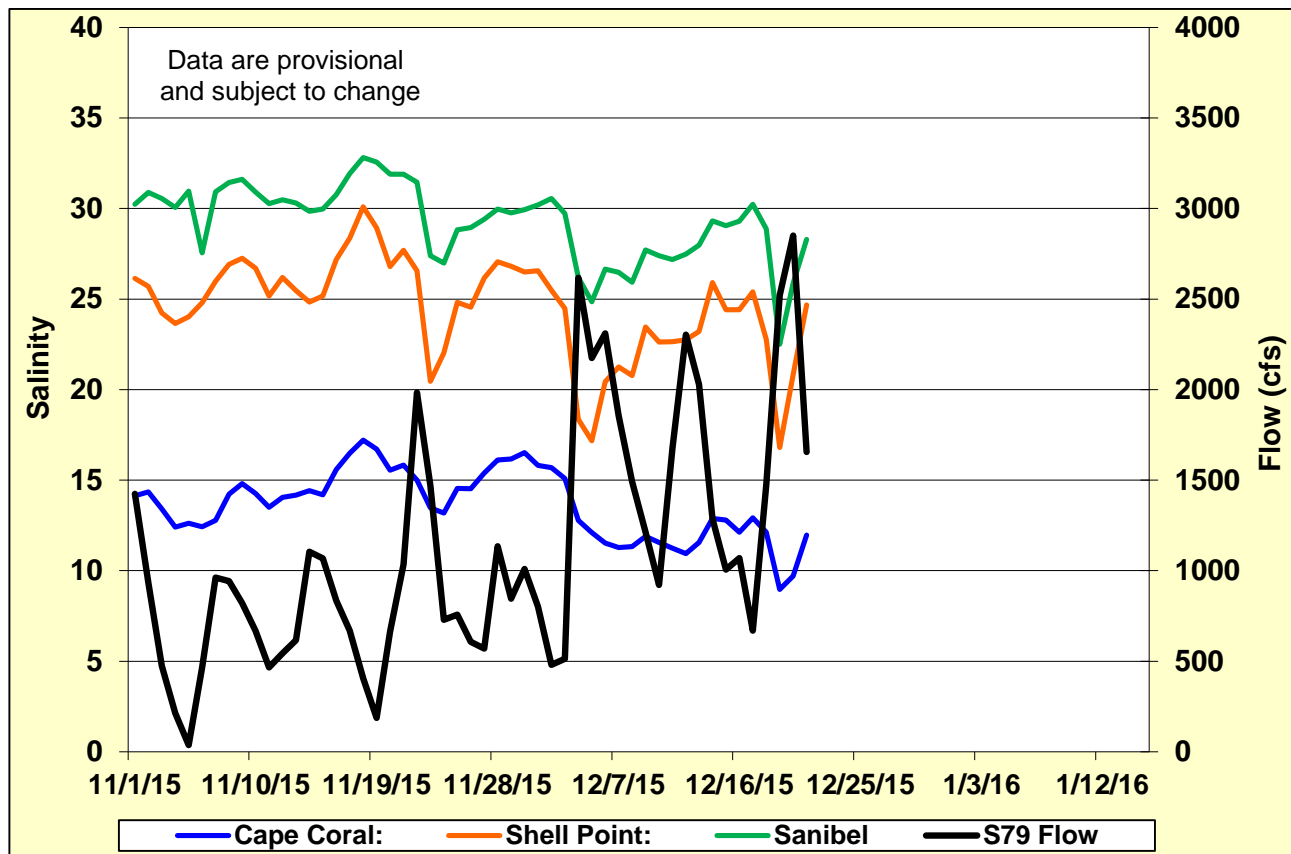


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

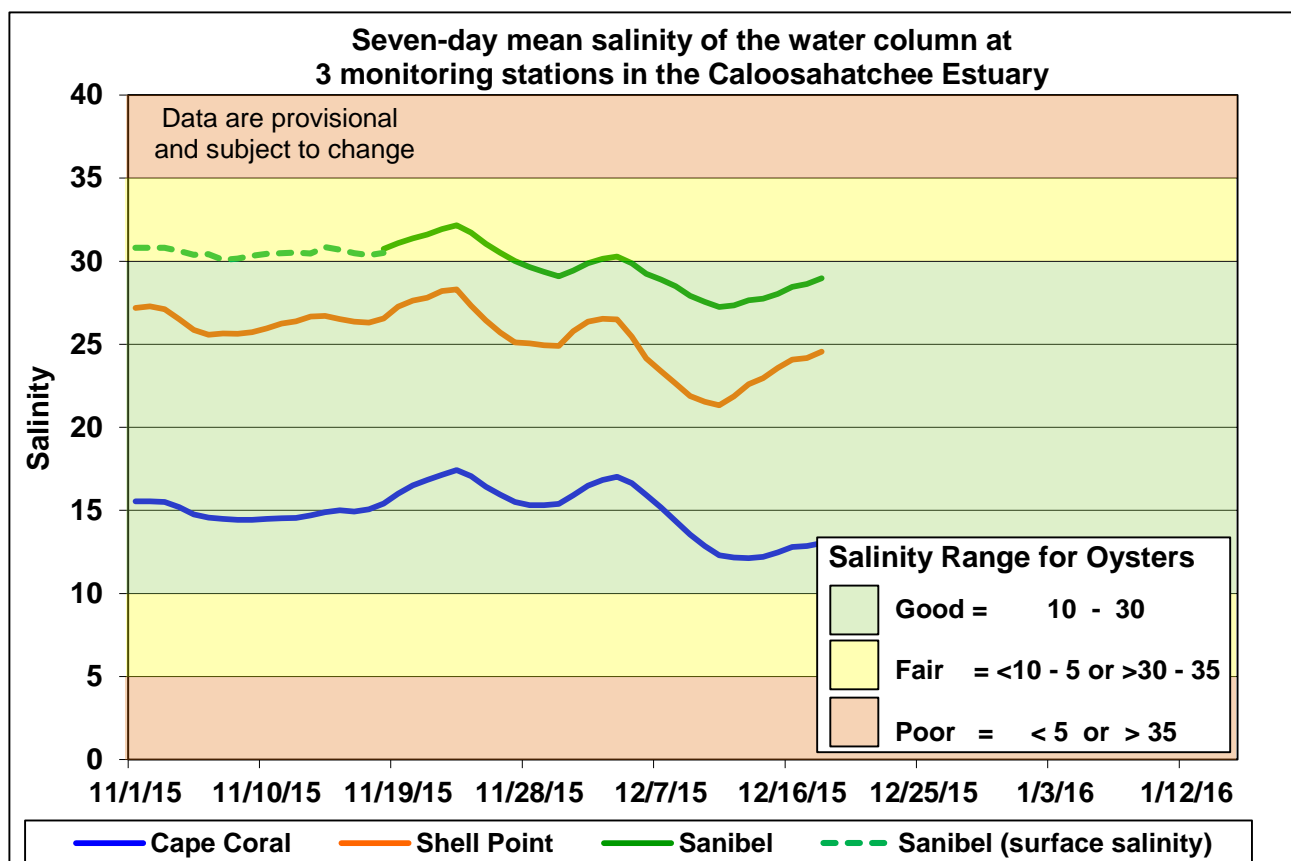


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

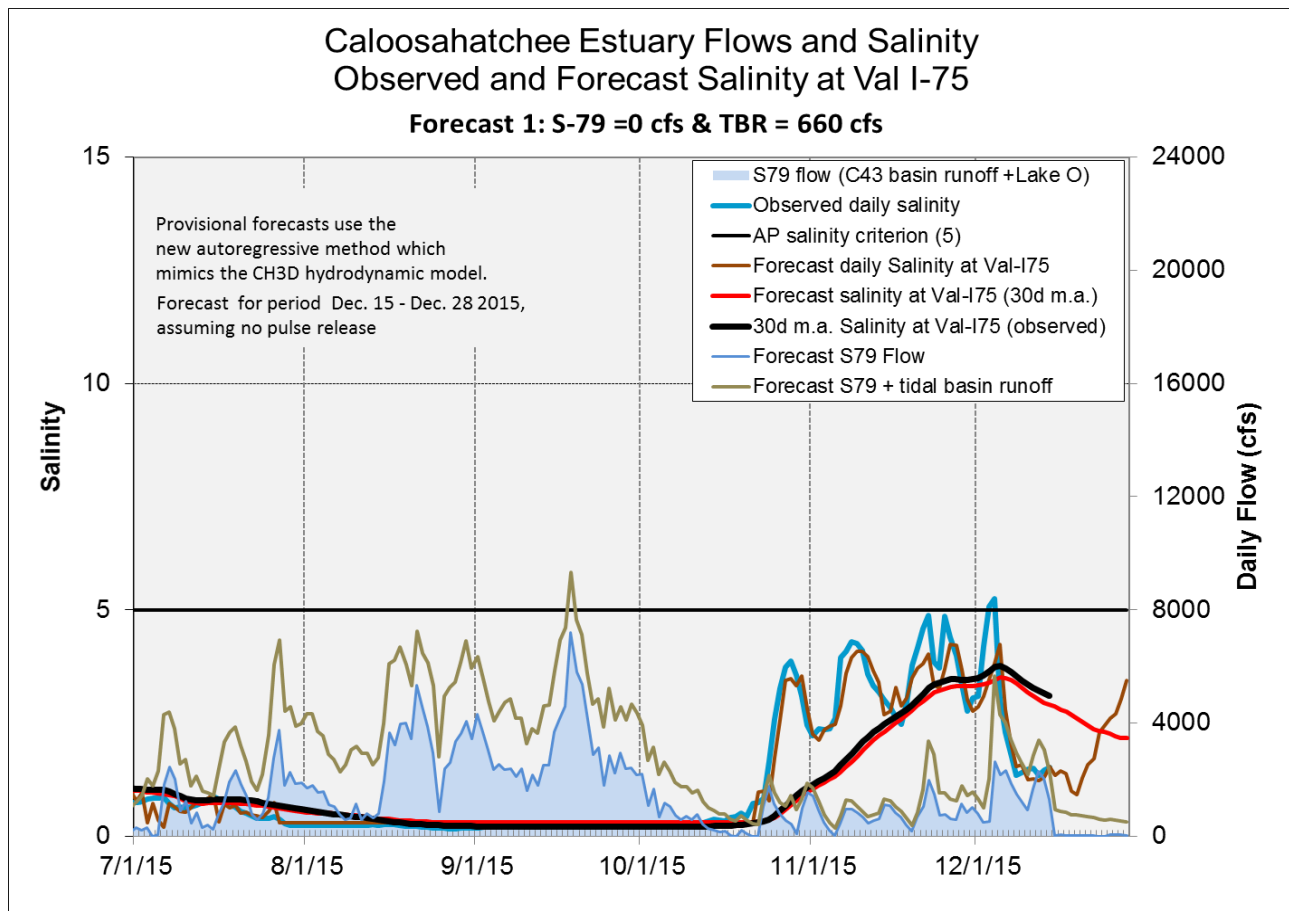
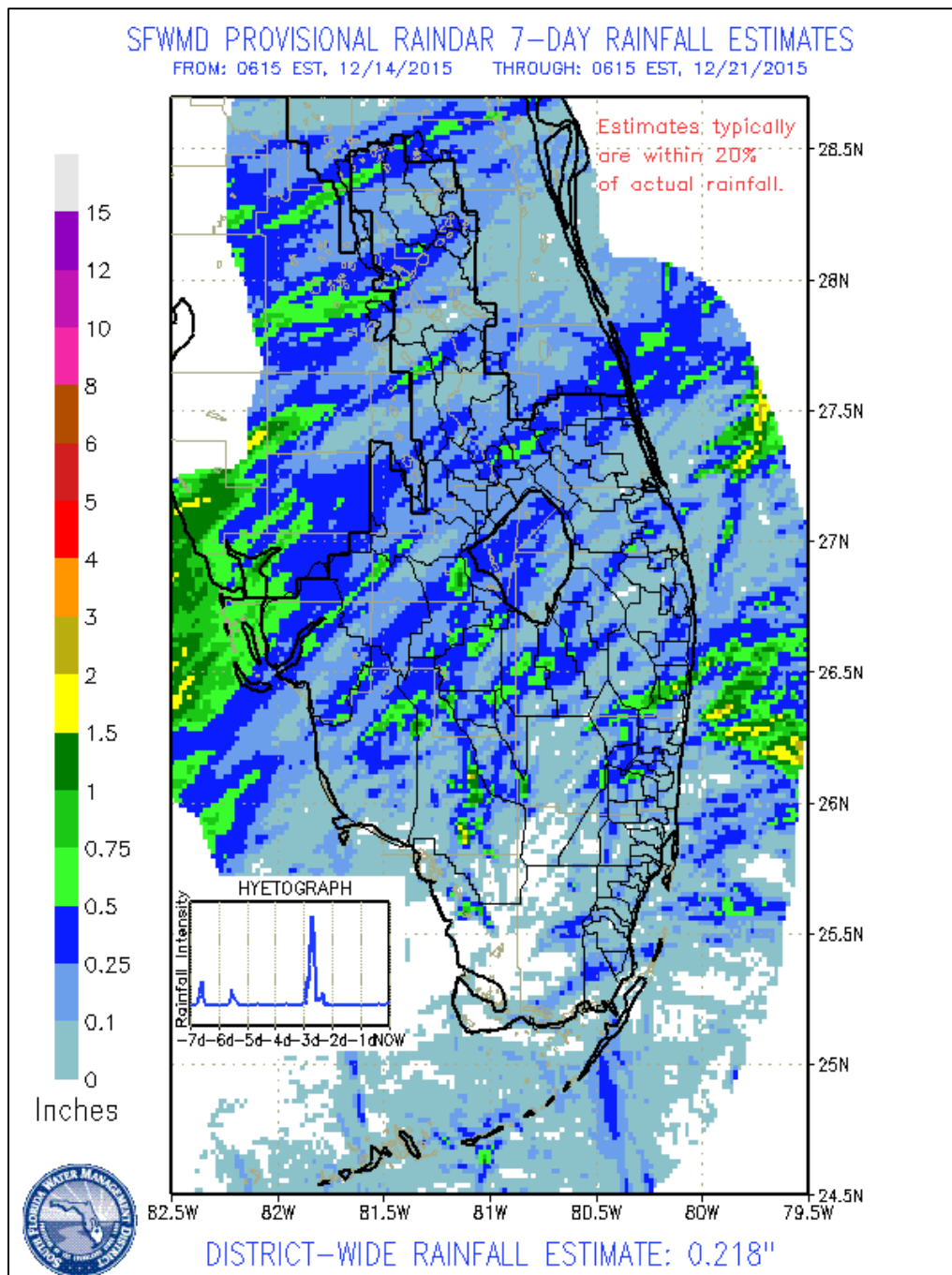


Figure 10. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

GREATER EVERGLADES

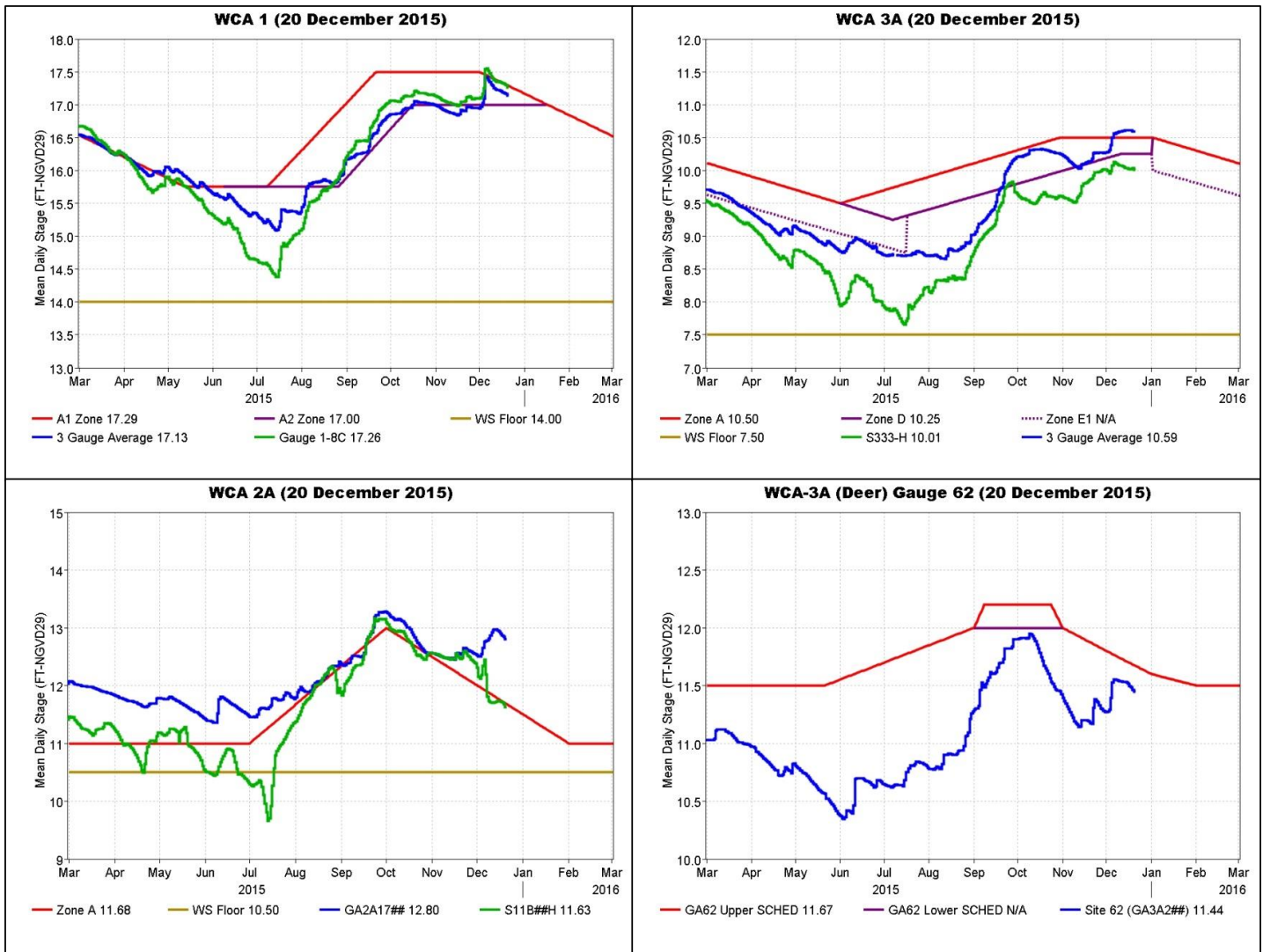
Rainfall again was very light in the WCAs and ENP. Basin averages ranged from 0.05 inches to 0.28 inches with the maximum local rainfall of 1.28 inches in WCA-1. Stage changes ranged from -0.04 feet to -0.21 feet throughout the region. Pan evaporation was 0.77 inches, about the 0.76-inch pre-project average.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.22	-0.11
WCA-2A	0.28	-0.21
WCA-2B	0.28	-0.12
WCA-3A	0.12	-0.04
WCA-3B	0.09	-0.05
ENP	0.05	-0.07



Regulation Schedules

Stages declined at the regulation schedule sites this week. The WCA-1 stage decreased to 0.16 feet below regulation, and the WCA-2A stage decreased to 1.12 feet above regulation. The three-gauge average stage in WCA-3A dropped slightly but remains in Zone A at 0.09 feet above regulation. The northwestern WCA-3A gauge stage (gauge 62) decreased slightly to 0.23 feet below the regulation schedule.



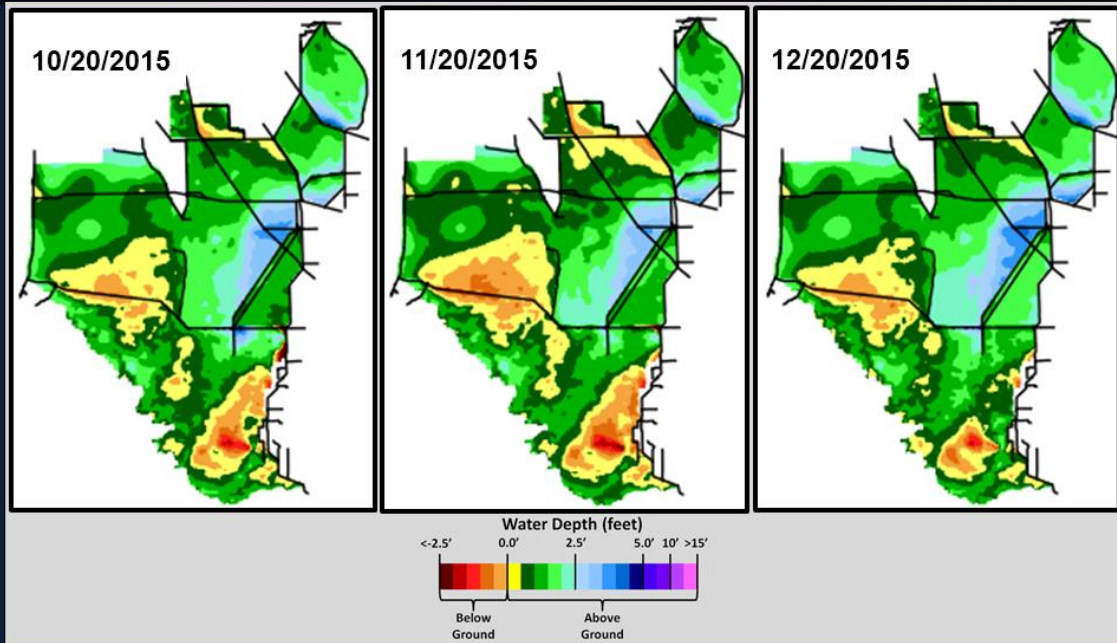
Water Depths and Changes

Water levels in the WCAs and ENP remain higher than those one and two months ago. Water depths at the monitored gauges range from 1.33 feet to 2.75 feet (both in WCA-3A), excluding WCA-2B. Stages at gauge 65 in southern WCA-3A have exceeded 2.5 feet for five weeks, the stage of concern for tree island inundation-duration.

Stages declined last week across most of the Everglades except where high inflow is occurring in northeastern WCA-3A as well as in central ENP. Water levels locally remain up to two feet higher than a month ago and a year ago. Individual stage gauges changed from -0.21 feet to +0.01 feet last week.



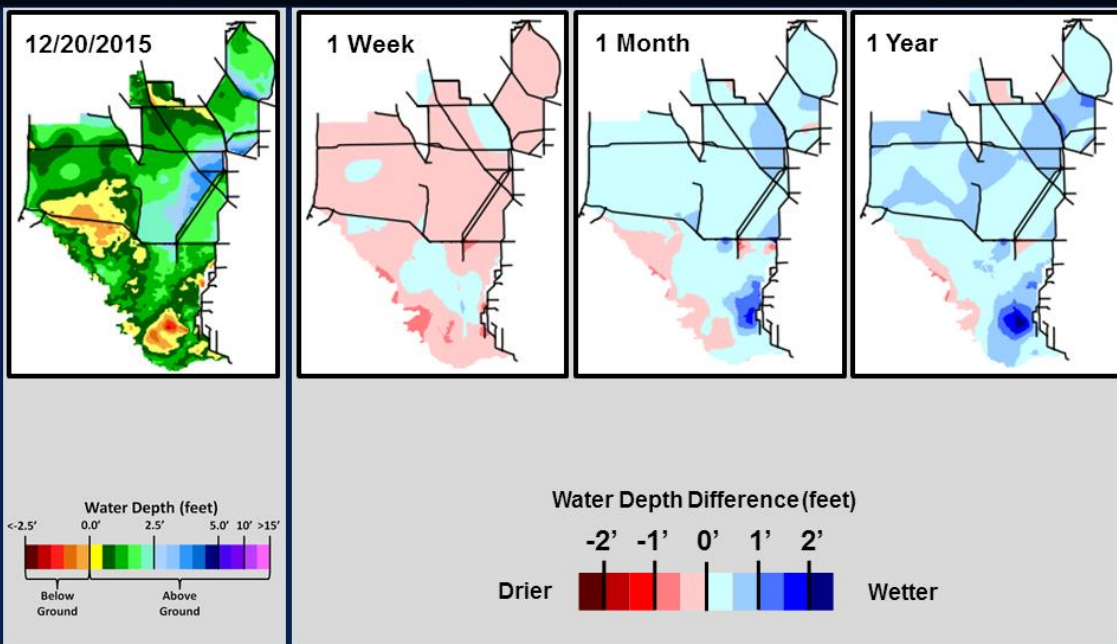
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



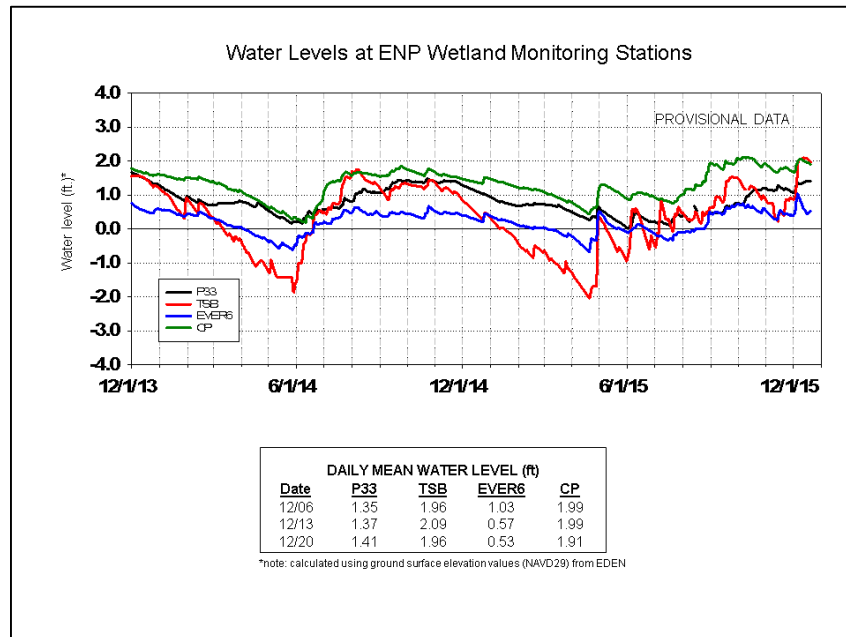
SFWDAT Everglades Difference Maps (Present – Past)



South Florida Water Depth Assessment Tool (SFWDAT)

Everglades National Park (ENP) and Florida Bay

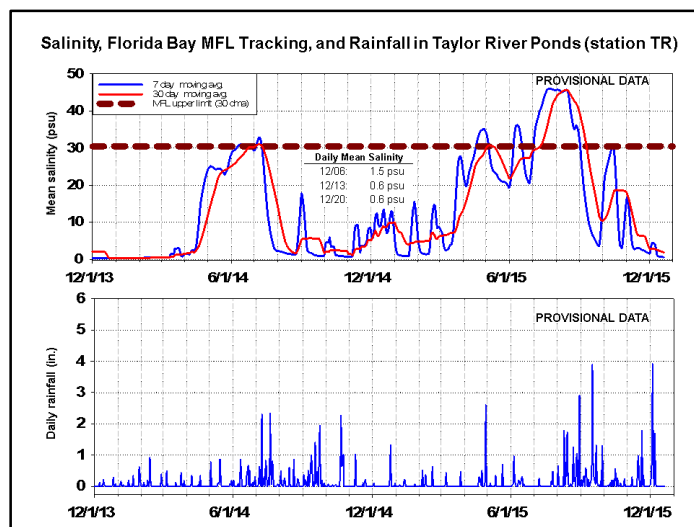
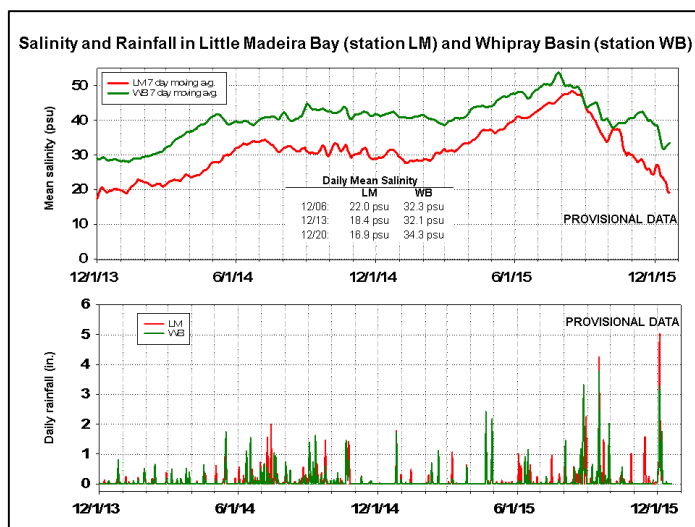
Water levels decreased last week in ENP as rainfall slowed but they remain higher than a month ago. Taylor Slough stages are three to 13 inches above average for this time of year. Water is still moving into Taylor Slough and the ENP panhandle, but S197 is closed.



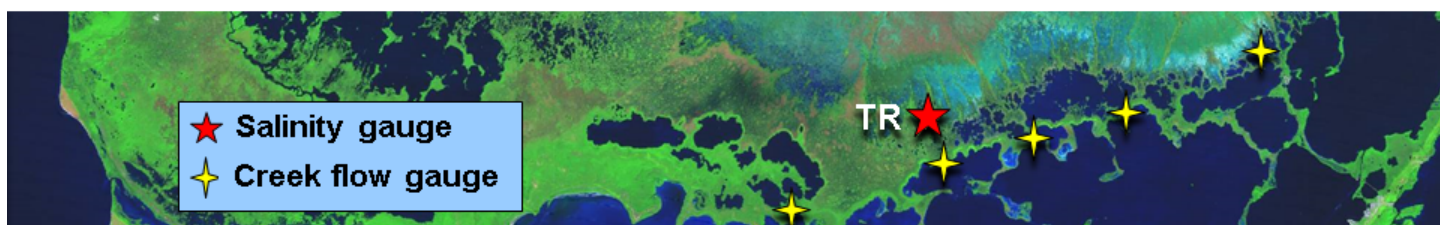
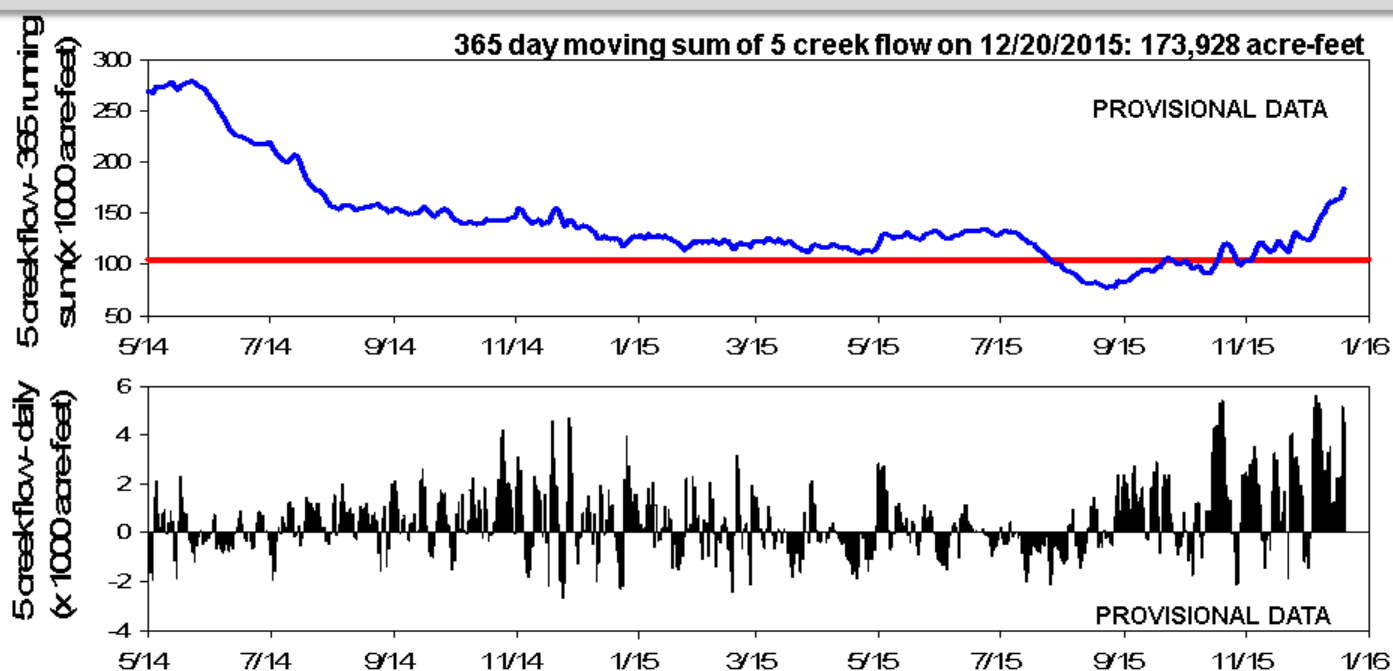
The largest change in Florida Bay salinities this past week was a decrease of ten psu in the western nearshore embayments. All areas of Florida Bay are within five psu of their historic averages for this time of year. The daily average salinity at the MFL sentinel site of TR stayed at the seasonal average of 0.6 psu. The 30-day moving average salinity decreased to 1.9 psu.

No detrimental effects have been reported at this time resulting from the large amount of freshwater moving through S197 into Manatee Bay and Barnes Sound. However, extreme stratification was noted last week when a spot sample in Manatee Bay revealed surface salinity at 4.5 and bottom salinity at 22 in only five feet of water, so the benthic community had not begun to experience the low salinity from the large inflow of freshwater.

The 365-day running sum of the cumulative flow from the five creeks feeding Florida Bay increased to 173,928 acre-feet (68% of average). Daily differences in the 365-day running sum of the cumulative flow from the five creeks represents the difference between current daily flow and flow a year ago. For comparison purposes, the average 365-day running sum for this flow over the period of Water Years 1997 to 2014 is 257,628 acre-feet. Cumulative flow from the five creeks last week (December 14 to 20) was 18,454 acre-feet, about 13,700 acre-feet higher than average for this time of year but lower than the previous week (25,476-acre-feet, about 21,650 acre-feet above average). Creek flow is provisional data from the USGS and is highly variable from day to day.



5 Creek Cumulative Flow and Florida Bay MFL Flow Criteria Tracking



Water Management Recommendations

- Regular dry season recession rates are needed starting in January to support wading bird foraging and nesting. It is important to facilitate ongoing recessions and prevent reversals to provide good wading bird habitat.

- No additional inflow into northeastern and northwestern WCA-3A is needed in the short term. The average stage for gauges 62 and 63 should remain under 11.60 feet (now 11.24 feet).
- We recommend moving as much water south into ENP and Florida Bay as possible and for as long as possible to improve hydrological conditions.

Site-specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

Summary of Everglades Recommendations, Dec. 22, 2015 (SFWMD) (red is new text)				
Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stage decreased from -0.09' to -0.12'	Rainfall, ET, management	Follow normal seasonal practices. Prevent repeated or ongoing reversals as much as possible.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities. Provide moderate recession rates to support wading bird foraging, necessary for successful nesting.
WCA-2A	Stage decreased - 0.21'	Rainfall, ET, management	Follow normal seasonal practices. Prevent repeated or ongoing reversals as much as possible.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities. Provide moderate recession rates to support wading bird foraging, necessary for successful nesting..
WCA-2B	Stage decreased - 0.11' to -0.13'	Rainfall, ET, management	Follow normal seasonal practices.	High stages generally preclude wading bird use, but can provide good habitat for wading bird foraging as stages decline at the end of the dry season.
WCA-3A NE	Stage increased 0.01'	Rainfall, ET, management	Releases into far northeastern and northwestern 3A are optional for the next few weeks. The average water stage of gauges 62 and 63 should remain under 11.60 feet (11.24' on 12/21) for terrestrial wildlife. Prevent repeated or ongoing reversals in NE 3A as much as possible.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities. Provide moderate recession rates to support wading bird foraging, necessary for successful nesting..
WCA-3A NW	Stage decreased - 0.10'	Rainfall, ET, management		
Central WCA-3A S	Stage decreased - 0.02'	Rainfall, ET, management	If El Nino conditions continue to produce higher than normal dry season stages, then additional inflow will not be needed. Prevent repeated or ongoing reversals as much as possible. Stages at gauge 65 have exceeded 2.5' since Nov. 23.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities. Provide moderate recession rates to support wading bird foraging, necessary for successful nesting.
Southern WCA-3A S	Stage decreased - 0.04'	Rainfall, ET, management		
WCA-3B	Stages changed from -0.02' to -0.08'	Rainfall, ET, management	Follow normal seasonal practices. Prevent repeated or ongoing reversals as much as possible.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities. Provide moderate recession rates to support wading bird foraging, necessary for successful nesting.
ENP-SRS	Stage decreased - 0.07'	ET, rainfall, topography, management	Make discharges to the Park according to the ERTF rainfall plan.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities.
ENP-CSSS habitats	S-12A is closed to enhance pre-breeding dry-down	Rainfall, ET, management	Follow rainfall plan for releases	Provide habitat and appropriate nesting conditions for CSSS.
Taylor Slough	3-13 inches above average	Rain, ET, inflows	Move water southward as possible	Provide freshwater buffer for ecosystems and freshen saline conditions downstream
FB- Salinity	Within 5 psu of average	Rain, ET, inflows, wind	Move water southward as possible	Southward flows are still needed to reverse/slow salinity increases